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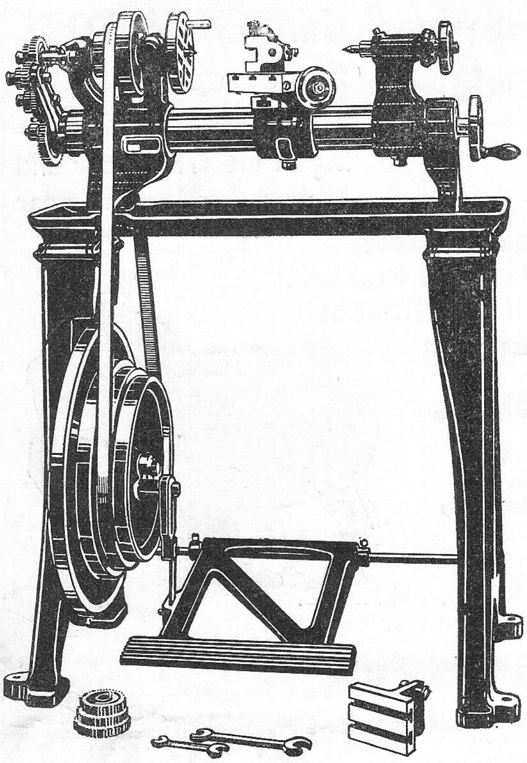

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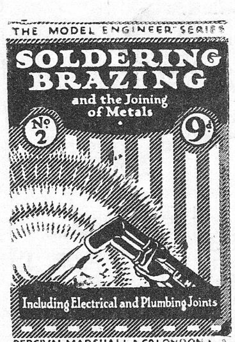

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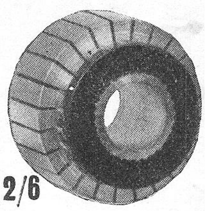

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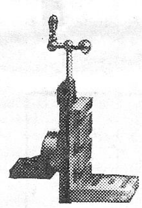

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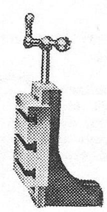

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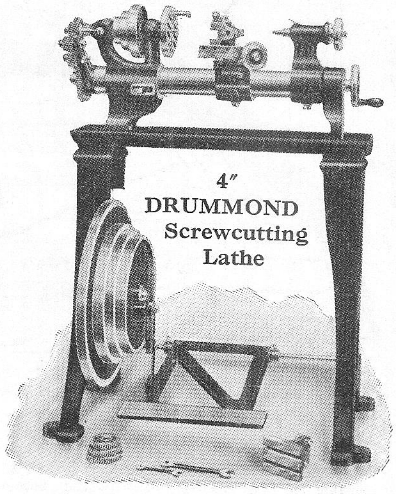

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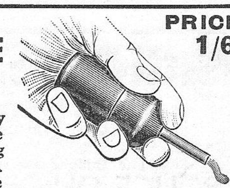

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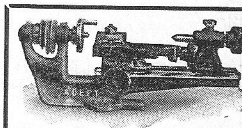

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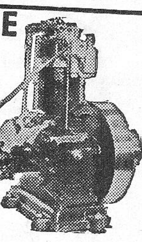

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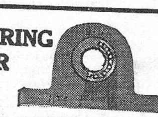

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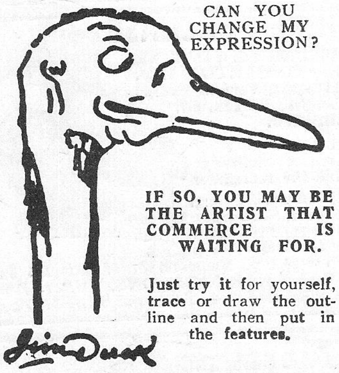

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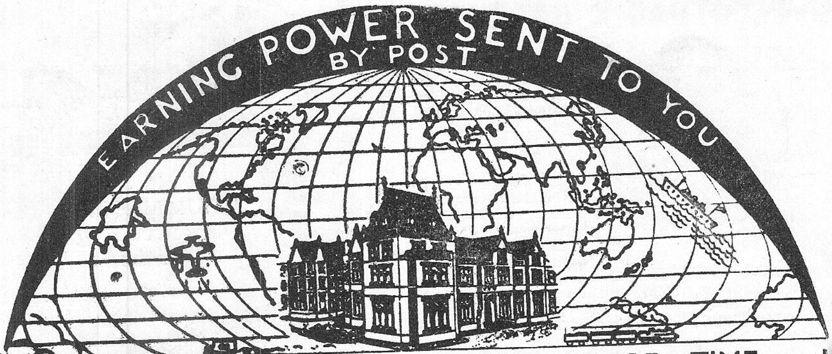

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OPEN LETTER TO PARENTS

Dear Sir or Madam,—When your children first arrived they brought with them a wonderful lot of sunshine. Later you became proud of the intelligence they displayed, but still later you became anxious as to what would become of them in the future. Perhaps you were anxious when you visualised them as grown men and women. Even with plenty of money it is not always easy to select the right career, and a parent is sometimes inclined to ask advice of some relative, and in ninety-nine cases out of a hundred that relative knows nothing at all about the possibilities of employment. Why not let me relieve you of some of your anxieties? In fact, why not let me be their Father? We do not profess to act as an employment agency, but the nature of our business compels us to keep an eye upon the class of men and women that are wanted and who wants them. There are some people who manufacture an article and put it on the market to sell. We do not do that, we work in exactly the opposite direction. We find out what employers want and we train our students to fill those jobs. We have to be experts in the matter of employment, progress and prosperity. If you have any anxieties at all as to what your sons and daughters should be, write to me, or, better still, let them write to me personally—Fatherly Advice Department—and tell me their likes and dislikes, and I will give sound practical advice as to the possibilities of a vocation and how to succeed in it. Yours sincerely,

J. H. Bennett

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SMOKE RINGS

A Special Exhibition Track Prize.

MY readers will no doubt remember that in my "Smoke Rings" I recently recorded a pleasant chat with Mr. Arvid Ohlin, of Stockholm, who has become a very enthusiastic model engineer. Mr. J. C. Crebbin has lately paid a visit to Stockholm, where he and Mr. Ohlin have spent many happy hours together in the latter's finely-equipped workshop, solving the many little problems in engine and boiler building which confronted Mr. Ohlin in his novitiate days. Mr. Ohlin, as I mentioned in my earlier note, is very impressed with the good-fellowship of model engineers which he experienced during his own visit to London, and during "Uncle Jim's" return visit to Stockholm. To mark his appreciation of this spirit, and to indicate his own feeling of enthusiasm for the steam model locomotive, he entrusted Mr. Crebbin with a gift to the model locomotive engineers of this country. This is in the form of a handsome silver salver, suitably inscribed, which has been entrusted to me to award as a special prize at our Exhibition. No conditions of any kind are attached to this prize, save that it is to be awarded as a mark of recognition for good running service on the S.M. and E.E. track during the Exhibition. It will not necessarily go to the most interesting or best-built locomotive, nor to the one which does most hours of running. It is to be in the nature of a surprise award at the close of the Exhibition to someone who has contributed in good measure to the success of the track-running and to the interest of our visitors. I think this is a very graceful gesture on the part of Mr. Ohlin, and on behalf of the model engineers of this country, I extend our grateful thanks. It is yet another indication that the friendship of model engineers is universal; it knows no boundaries of land or sea, or language.

* * *

The "M.E." Exhibition and Sundays.

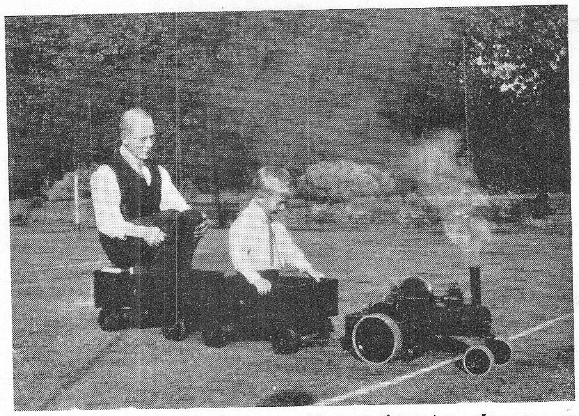
I HAVE received several enquiries asking if our Exhibition is opened on Sundays, my correspondents desiring to make their travelling arrangements accordingly. The answer is that we do not open on Sunday. Although certain museums and other places of public instruction and entertainment adopt Sunday opening during limited hours, as a matter of general convenience, we feel the case is different with our own Exhibition. The normal times of opening keep everybody connected with the Exhibition fully occupied, and we think their day of rest is well earned. While as organisers we might add considerably to our gate receipts by a Sunday opening, we do not think it would be right to do this at the expense of the many helpers who in various ways assist in making the show a success.

* * *

A Show Without Music.

WE are trying the experiment this year of omitting musical items from our Exhibition. I know that opinions are divided about this; some of our visitors like to hear the music and others do not. Many people have told me that it interferes very much with their conversation

with exhibitors and with one another, and in other ways distracts their attention from the exhibits they come to see. There will always be the music of the locomotives running on the track, and to some ears this is sweeter than the strains of the "Blue Danube" waltz, or some of the mysterious forms of modern "jazz."



Mr. Tyrrell Cooke's traction engine at work.

* * *

Friendships in Model Engineering.

A HAPPY features of experiences through being a model engineer is the linking up which inevitably occurs, somehow or other, between individuals engaged with model engineering, and who, otherwise, would probably never have made acquaintanceship. Years ago the late Mr. H. G. M. Conybeare introduced us to one of his friends, Mr. S. W. Wortley, of Brentwood, who was interested in establishing a home workshop and a model railway. Later we met this gentleman enjoying a meeting of model engineers at Mr. S. W. Simpson's railway track, at Brentwood. A very good friend of the MODEL ENGINEER is Mr. Tyrrell Cooke, of Brentwood ; we meet him at Mr. Simpson's track and have discovered that he and Mr. Wortley are model engineering friends. Here is an excellent photograph we have received from Mr. Cooke showing himself, his traction engine model, and his grandson in Mr. Wortley's garden. In a letter he informs us that "Mr. Derek Wortley and myself want now to build a one inch scale locomotive, but I do not know if that will come off or not ; these models take such a long time to build, as you know." We shall cherish a hope that the two model engineers will decide to build the locomotive, and that in due course it may run many circuits on Mr. S. W. Simpson's railway.

* * *

The Doble Steam Car.

IN a letter which appears on another page of this issue, Mr. Abner Doble writes to point out that the car referred to in our recent "Smoke Ring" relating our experience of a ride in a steam car was none other than a genuine Doble car as made by him and imported into this country in the autumn of 1924. Whatever may have been done with this car by way of experimenting, it still remains the Doble car, and I am pleased to publish Mr. Doble's letter to remove any incorrect impression to which our original note may have given rise. I share, with many other engineers, a cordial admiration for Mr. Doble's genius as a steam engineer, and I am glad to find that he is still a reader of the "M.E." Many years ago he wrote me from his works in America to say how much the technical information in our pages was appreciated by himself and his staff.

* * *

"Jersey" Replies.

I WANT to thank all those who have kindly replied to the offer I recently published on behalf of my correspondent in Jersey. The replies have all been forwarded for his consideration, and I have no doubt he has now selected the applicant he considered most suitable for the work he requires. The replies came from all parts of the country, some of them obviously from well-qualified model engineers. Some of those who replied asked too many questions about the work, and said too little about their own qualifications for doing it. This no doubt added to my correspondent's difficulty in dealing with the many replies received.

* * *

Handicraft in the Y.M.C.A.

I HAVE received an interesting brochure advocating the formation of workshop studios in Y.M.C.A. centres. It points out in a most sympathetic and understanding manner the value of a workshop to young men having spare time on their hands, and gives some practical hints on how such handicraft facilities may be effectively provided. It may be obtained, price 3d., from the Y.M.C.A. Educational Department, Great Russell Street, London, W.C.1.

Percival Marshall

An Experimental $2\frac{1}{2}''$ Gauge Locomotive.

By K. L. MEYER.

HAVING a small son aged four years, who is an ardent " loco." enthusiast, I decided to have a shot at building one for him.

I was extremely interested in the design which had been published of Mr. Rogers' Sentinel type Loco, and it seemed to me to be just the thing to build for the youngster, as with its coal fire, it combined the desirable features of safety and realism ; but the budding enthusiast informed me that he " didn't like that ugly Loco " when I showed him the photographs of it (your pardon, Mr. Rogers).

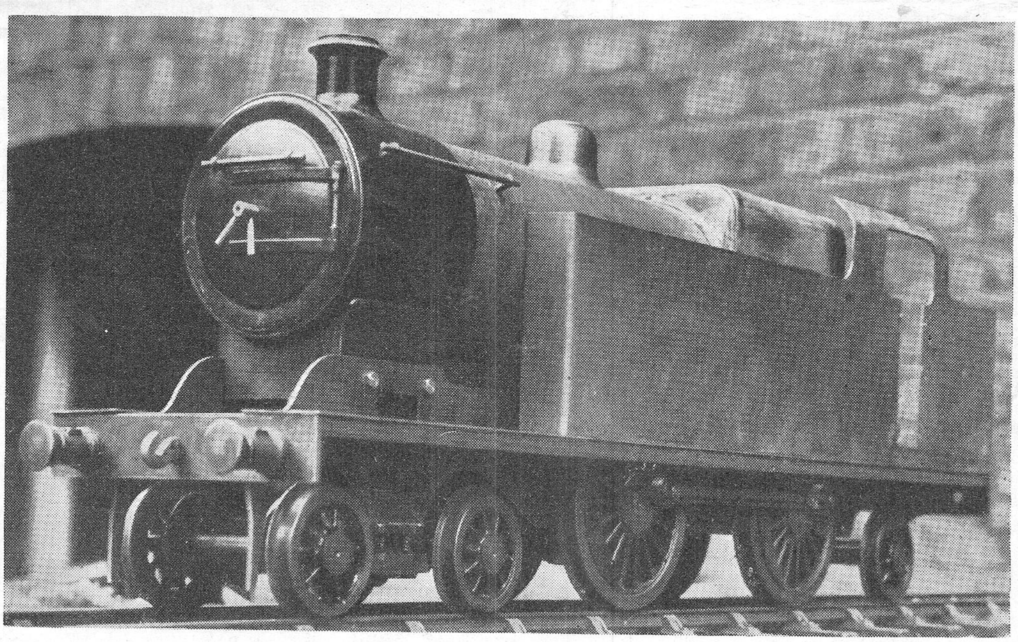
This obviously meant that one of conventional type would have to be made. I already possessed a half-inch scale 4-6-0 made by a certain firm in Sheffield (now out of business) which had been presented to me, but it was atrociously made, and the cylinders being of brass, it would not do for a flash boiler—the type I had decided on.

I started to get out a " design " utilising the frames and such other parts as could be used or modified for a 4-4-2 tank, but when the whole thing had been stripped down, I came to the conclusion that the only parts usable were the crank-shaft and bogie frame assembly. I still had Mr. Rogers' single-cylinder at the back of my mind, and as there happened to be among my scrap a block of cast iron with a nicely bored hole $\frac{7}{8}$ in. in diameter, which seemed almost made for the job, it was decided to utilise this to make up a single-cylinder geared loco, using a pair of wheels with a ratio of $2\frac{1}{2}$ to 1, which were in stock.

One of the reasons for adopting this scheme was that it would save time, but I am inclined to think now, that it would have taken no longer to have made a twin-cylinder job, as a good deal of planning was needed to arrange, among other things, for constant meshing of the gears with the sprung axle. This is actually carried out in a simple manner, by employing self aligning ball bearings for the crank-shaft, the housings of which are cast in one with the axle-boxes of the driving wheels as sketched (Fig. 1). The axle-boxes are slotted to fit the frames (no horn-cheeks being fitted) and the upper portions of the castings are slot-milled to take shouldered hex. screws tapped into frames.

Reversing of the engine is effected by a slip eccentric, the stop collar being formed by an extension on the crank-shaft pinion. There was not sufficient space to fit a separate collar, owing to the width of the ball bearings which had necessarily to be fitted inside the frames.

The performance of the chassis on its first test (using a small air tank pumped up with a cycle pump) was quite satisfactory. A six foot length of track was used, and one end was raised gradually by suitable pieces of packing, with the idea of seeing what gradient the chassis was capable of taking. With a seven pound bench anvil laid on top of the frames, it was found possible to make the job romp up a gradient of about one in seven, the initial pressure in the air tank being about 70 lbs. per sq. inch in these tests.



The model $2\frac{1}{2}$ in. gauge locomotive in its present state.

A point arises here in relation to valve setting. While with a single-cylinder engine you may add the necessary lap to a valve, it would appear that " lead " cannot be given, as with even the slightest amount of lead, the piston tends to bounce back on dead centre when running slowly. This naturally does not apply

when you have another cylinder to carry over the dead centre.

Some trouble was experienced with rusting up of the cast iron slide valve originally fitted, and on examination, the port-face was found to be so badly pitted as to need refacing. A bronze valve has now been substituted, and so far has given no trouble.

Having had a fair amount of experience with model power boats fitted with flash boilers of various designs, most of which were quite successful, I embarked lightly on the job of producing a coal fired flash boiler for this loco, not realising the difficulties to be encountered.

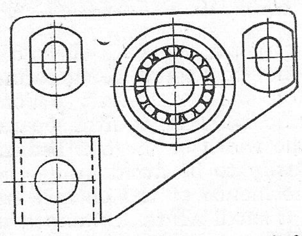


Fig. 1. Housing for axle box and crankshaft ball race.

Fortunately I used copper tube for the boiler coils, as it had to be unwound and re-made four times.

Having found with the boat boilers (which were all fitted with paraffin burners) a tendency to excessive super-heat, I took precautions to guard against this by shielding and bedding in fire-clay all parts of the coil which were in contact with the fire. So effective was this shielding, that although I gave the boiler nearly a quarter of an hour to warm up, and the fire was burning briskly, yet the boiler flooded before the cylinder was warmed up. I might mention that I had to make several attempts before I got the fire to burn properly—not having previously tried coal firing, and am indebted to "L.B.S.C.'s" articles for a great deal of help in the matter.

The arrangement first adopted for the boiler consisted of two helical coils, the inner one being closely wound on a 1 in. mandrel, and the outer one slightly open spaced with a dia. of 2 in. inside. Three pieces of nickel silver angle were inserted between the two coils, and wired in position to maintain a regular annular space, and the forward ends of coils brazed into a small socket. The tube was $\frac{3}{16}$ths × 18g., and the total length about 25 feet. The outer coil was wrapped round with woven asbestos, and made just to slide in the boiler casing, which was 3 in. dia. The fire-box was lined with about $\frac{3}{8}$ in. of "Pyruma" fire cement, and as already mentioned, the part of the coil which projected over the fire space was shielded. Fig. 2 is a sketch of the arrangement.

The next move was to discard the metal shielding, and to dig out some of the coils from their bed of fire-clay, but on test this seemed to make no appreciable difference to the performance. In the meantime, I had discussed the job with a friend who has had a good deal of experience with boilers of all sorts, and he suggested removing the fire-clay lining from the lower portion of the fire-box, and putting a few coils of tube in place of it. This was done, and also an additional 5 ft. 6 in. of $\frac{1}{4}$ in. × 20g. tube in hair-pin form was arranged inside the helical coil (which was increased in diameter to suit) to act as final super heater. The results obtained were decidedly better than before, but it seemed that a large amount of heat was still going to waste in the fire-box, so once again the whole lot was "lugged" out. The water feed in these tests was taken from a small pressure tank via a small screw-down valve, as the mechanical feed pump had not yet been fitted. The fitting, or rather the attempt at fitting, of this pump disclosed a snag. When making the drawings, I completed the outline and part-sectional elevation, but had not completed the plan, and finding a vacant space on the driving axle which gave a clearance between the crankshaft and valve eccentric, decided to fit the pump eccentric there, only to discover after having made a pattern and obtaining a strap casting, that this space was intended for the spur-wheel driving the axle. The motion plate casting had already been made with a lug to house the pump body, and it was difficult to see where else the pump could go, as the rear coupled axle came under the fire-bars, and made it impossible to fit it at the rear end of the frames. After exercising the "grey matter" for some time, the idea of linking up the pump to the cross-head presented itself, and seems to afford a satisfactory solution to the problem. The linkage employed gives a leverage on the pump-ram of slightly over 2 to 1—the stroke of the ram being $\frac{7}{16}$ths in. and the dia. $\frac{3}{16}$ths. This scheme allowed the pump to be attached

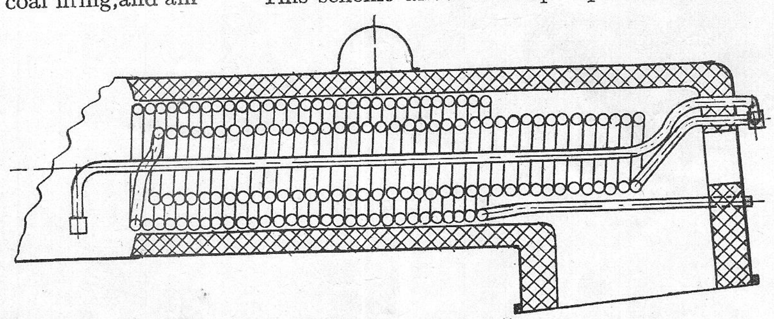


Fig. 2. The original flash boiler.

to the motion plate as originally intended, but turned back to front. The drive for link is taken from the screwed end of cross head gudgeon pin, a steel cap-screw combining the functions of locking the gudgeon pin and providing a bearing for the link (Fig. 3).

Reverting to the boiler, I concluded that it would be best to modify the whole thing, and fit a Belpaire type fire-box casing, which would house the major portion of the boiler coils (on a horizontal plane) with a single coil having "staggered" turns running through the centre of the boiler casing. The horizontal fire-box coils were wound on a rectangular stepped former as sketch (Fig. 4), the corners of which

were cut to a suitable radius. The "stepping" of the former was necessary in order to reduce the " fore and aft " length of the upper turns, which were wound three deep in a similar manner to a "slab"-wound electrical coil. Starting at the bottom end of former, one layer was wound on, then doubled back on itself as far as the second step, and finally run back to the top (Figs. 5 and 6 explain this).

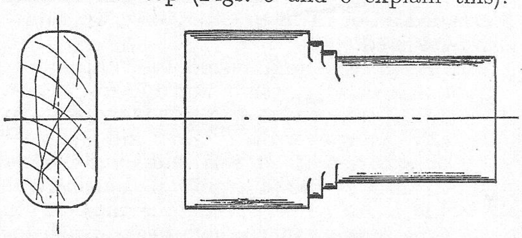


Fig. 4. Former for fire-box coils.

Owing to the height of this coil, it was necessary to put the fire hole very near the top of the casing. This looked very unorthodox, but was a convenience in firing—particularly on a tank loco. The water was fed into the staggered coil at the smoke box end, and passed on to the bottom fire-box coils, steam being taken from the top to a screw-down valve fitted with a quick-pitch screw. This arrangement of the boiler appeared quite satisfactory when first tried, but subsequent tests proved it to be too susceptible to slight variations in the burning of the fire.

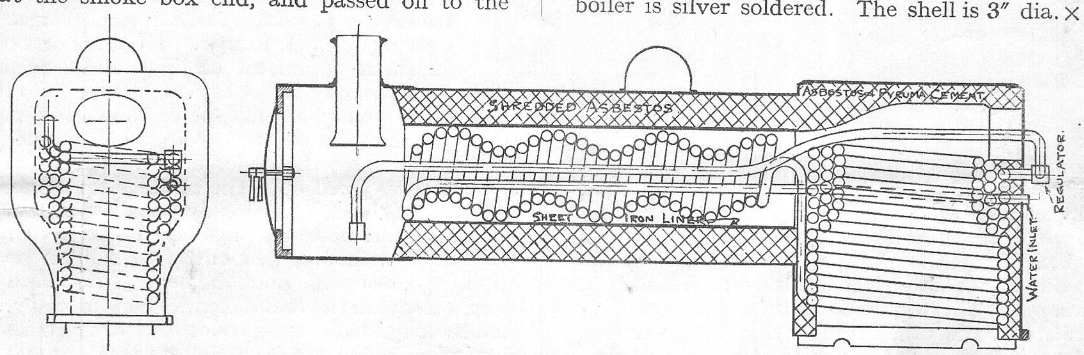


Fig. 5. Modified flash boiler.

By this time, I had come to the conclusion that a flash boiler was not a suitable generator for this loco, so decided to try a "Smithies" water-tube boiler—although I was not very optimistic as to its performance, in view of my previous experience.

When it is considered that the single cylinder $\frac{7}{8}'' \times 1''$ geared $2\frac{1}{2}$ to 1 is roughly equivalent to a pair of $1'' \times 1''$ cylinders, it does seem to be asking something of the boiler. The "Smithies" was made with a $2'' \times$ 20g. drum, five $\frac{1}{4}'' \times$ 26g. water tubes were fitted "Averill" fashion in the forward end, and a cast gun-metal header was used at the fire-box end with the idea of avoiding sharp bends in the tubes, and to provide a larger volume of water at the tube ends.

A Carson type vapourising burner was made and fitted with adjustable nipple, which enabled a flame from about 1″ to 4″ or more in height to be obtained, but neither with this or charcoal firing would the boiler put up anything but a mediocre performance.

There were now two courses open. Either to reduce the cylinder bore by fitting a liner, or to build yet another boiler of higher efficiency. I decided to try the latter.

Some years previously I had built a Yarrow water-tube boiler, which for its size had a wonderful evaporative efficiency, and it appeared quite possible to combine this type (at the fire-box end) with a normal fire-tube barrel.

A few sketches and rough drawings were made, when it was found possible to get forty-two $1\frac{1}{2}'' \times \frac{1}{4}''$ water tubes in the fire-box, with ten $\frac{3}{8}''$ fire tubes, and two $\frac{5}{8}''$ flues in the barrel. As will be seen from the photograph (Fig. 7), the water tubes are arranged in two rows on either side of the D shaped barrel extension, and are fitted into two small D shaped mud drums. Girder stays are fitted in the top drum, which is made in one piece with the barrel by cutting and bending—the riveted and brazed lap-joint being on one side. The whole of the boiler is silver soldered. The shell is 3″ dia. $\times$ 16g. S.D. copper tube. The fire tubes are $\frac{3}{8}'' \times$ 26g. flues $\frac{5}{8}'' \times$ 24g., and water tubes $\frac{1}{4}'' \times$ 24g. The two small water tubes which extend from the "throat-plate" to the under-side of top drum serve the dual purpose of carrying a baffle (made of perforated sheet iron covered with " Pyruma " fire cement) and also to act as syphon tubes.

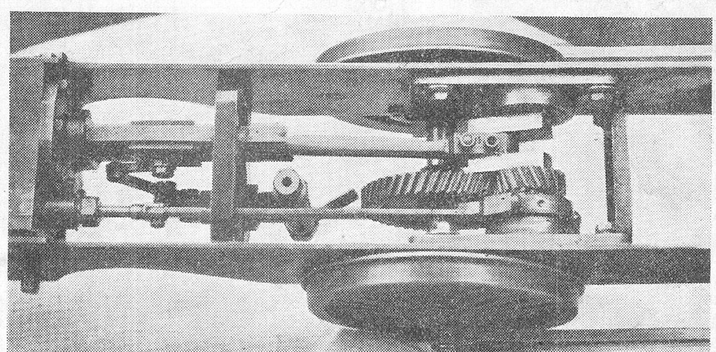


Fig. 3. The engine motion and reduction gearing

The D shaped mud drums are formed from $\frac{9}{16}'' \times$ 20g. copper tube, approximately $\frac{1}{2}''$ bore, so that a piece of $\frac{9}{16}''$ rod with a flat cut on it

extending to half its diameter and with the edges rounded off will just drive in if the tube is annealed. A little treatment with a mallet will soon loosen it sufficiently for the tube to be pulled off.

Each small drum accommodates twenty-one water tubes in two rows with a space of $\frac{1}{16}''$ between each.

The forty-two tubes were cut to length in a simple wooden jig, which eliminated any danger of deforming the tube.

After cutting, the ends were cleaned up with a simple tool made from a short length of $\frac{5}{16}''$

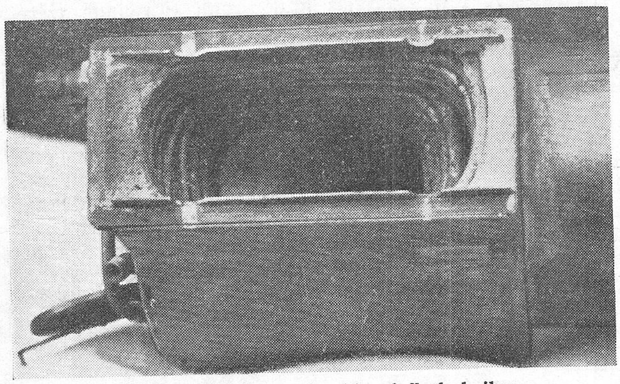


Fig. 6. View from underside of flash boiler, showing fire-box coils.

round mild steel. This was drilled up a distance of 3/32" with a $\frac{1}{4}''$ drill, and two saw cuts at right angles were made across the end extending just beyond the bottom of the drilled hole, after which it was case-hardened. The burr on the inside of the hole then forms quite an efficient scraper. The tool is held in a drill chuck in tailstock, the tubes being lightly gripped in a three-jaw chuck. This method has the advantage of giving a cleaned surface of uniform length on each tube, as the tool is simply fed in until the bottom of the hole reaches the end of the tube, and a further benefit is found when assembling the tubes in the drums, as one can easily see when all the tubes are equally entered in the holes in the drums.

With regard to assembly, after the fire tubes and tube plates had been fitted and silver-soldered, the small drums were tackled. Each tube was annointed with "Boron" compo before being inserted into the drum, and I may remark here that while "Boron" compo may be extremely satisfactory for brazing, in my experience, on many jobs it is not so suitable for silver-soldering as lump borax which has been ground with water on a slate to a creamy paste.

To return, however: the tubes were then silver-soldered into the small drums, and after pickling, were entered into the top drum—a process which took a deal of "wangling," owing to the shortness of the tubes. Having eventually persuaded all of them to enter, they were duly silver-soldered.

The boiler has been tested to 200 lbs. per quare inch water pressure, and 120 lbs. steam.

The first steam test was made without any casing over the fire-box end: a piece of asbestos sheet was laid over it, and steam was raised from all cold in three and a half minutes, using the small Carson type burner which had been made for the Smithies boiler.

The next job was to make the fire-box casing. As this needed two flanged end-plates, and I did not wish to go to the trouble of making a metal former, I decided to use castings. I made use of a "dodge" which I had previously found useful, and made the pattern of sheet lead flanged over a ply-wood former. I obtained two excellent gunmetal castings from this. It was only necessary to clamp one of them on the face-plate and trepan a disc, to leave the hole needed for it to fit over the boiler barrel. The usual little snag cropped up. The seatings for dome, safety valve, etc., had already been fitted, and the front end plate castings could not be got past these without either cutting a slot in the top flange, or opening out the hole. I discussed the matter with the friend mentioned previously, and he suggested cutting a slot to clear the bush in the lower side of the casting, so that it could be pushed on upside down over the barrel until it had passed the bush, and then swung round to its proper position. Simple! but I had not thought of it. The effective grate area (inside the fire-clay lining) is roughly six square inches. The fire-bars are $\frac{1}{4}'' \times \frac{1}{16}''$ with $\frac{1}{8}''$ spacers between.

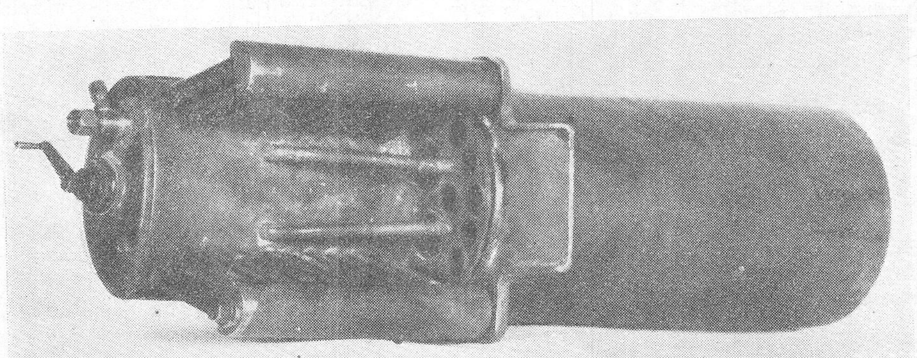


Fig. 7. Underside of water-tube boiler.

The water gauge, which was mounted on a column $\frac{3}{8}''$ in dia. and had 5/32" water-ways, gave some trouble as at first fitted. The lower end was connected to one of the small drums, and the upper end to the whistle turret. As soon as the boiler began to warm up, the water in the gauge-glass disappeared—presumably owing

to the rapid circulation in the tubes. I quite realised the possibility of this happening if the gauge was fitted in this position, but decided to try it, to see the effect, as it was a very convenient position. A perforated pipe $\frac{3}{16}''$ dia. and running almost the whole length of the small drum was then attached to the lower end of gauge column, with the idea of collecting water from various points, but this made no appreciable difference to its behaviour. This arrangement was scrapped, a new and rather neater gauge was made from $\frac{5}{16}''$ square brass rod, combining gauge fittings and gauge-glass protector, as photograph (Fig. 8). The lower end of this is connected to an extension piece at right angles, which is fitted on the back-head, taking water from the lowest point on the upper drum—the upper end being connected as before to the turret. When this was tried out, it was no more reliable than the previous arrangement, but with the difference that the water remained in the glass at approximately the same level until steam was raised, and the blower turned on, and then rushed up the glass in company with numerous steam bubbles. Concluding that turbulence was the cause of the trouble, the fitting was taken off, and a piece of 7/32" brass tube attached to the extension piece, of sufficient length to reach beyond the fire-box crown (if I may so call it) to the relatively calm water in the barrel. While I had it off, I examined the passages, packing washers, etc., for possible obstructions, but could see none, and as the bore of fitting and gauge-glass is about 5/32", it hardly seemed likely that the trouble was here. To cut a long story short, the gauge was put back, steam was raised with auxiliary blower, and all appeared well — the water remaining almost stationary in the glass. With about 10 lbs. on the pressure gauge, the blower valve was opened: immediately the water rose to the top of the gauge. Aha! A clue!

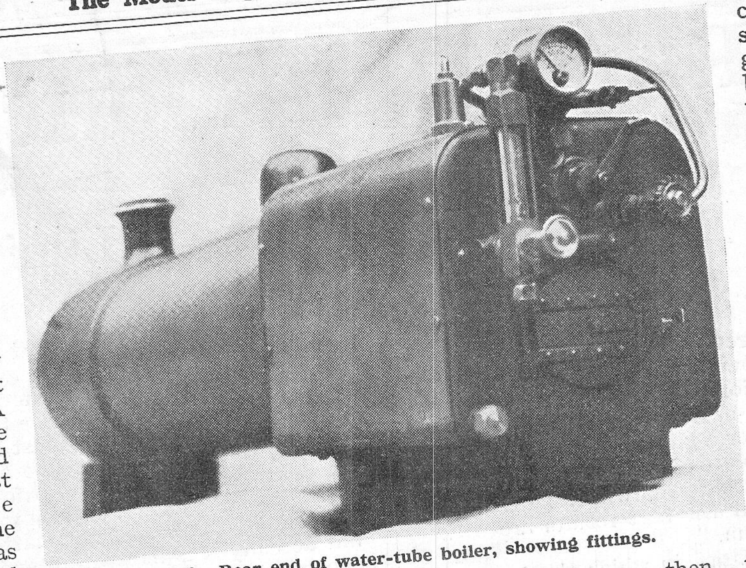


Fig. 8. Rear end of water-tube boiler, showing fittings.

The blower was then turned full on, and the gauge repeated its trick of "forever blowing bubbles." It was fairly evident that in fitting both the top connection of water gauge and the blower valve pipe to the whistle turret, an ejector action was taking place when the blower was on, lowering the pressure at the top of gauge, and consequently allowing the water to rise. Since making a connection to a point further along the drum, the gauge has given no further trouble.

To conclude this somewhat lengthy and rambling account of my efforts, I may say that in the eighteen months of spare time which I have spent on this loco (as yet unfinished) I have probably gained far more experience than I should have done by following a published design—apart from which the unorthodox always appeals to me, but in this particular case I should undoubtedly have attained at least as good a final result with far less trouble, had I done so.

No passenger hauling tests have yet been made, owing to the incomplete state of the job, and the fact that I have not a sufficient length of track, but if the matter is of any interest, I will, with the Editor's permission, send further details at a later date.

For the Bookshelf.

Your Car: How it Works. By A. G. Douglas Clease, B.Sc. (London: Iliffe and Sons, Ltd.) Price 1s., postage 2d.

Although the motor car is nowadays one of the most indispensable adjuncts to civilisation, its working is still very much of a mystery to many people who use it daily for business or pleasure. This book sets out to explain in simple language the function and operation of all the mechanical parts of a car, and with the aid of the numerous explanatory drawings, no difficulty should be experienced by anyone in gaining a considerable amount of practical knowledge of the engine, transmission, braking, and electrical equipment of a car.

The Slide Rule. By Chas. Hoare, C.E. (London: The Technical Press, Ltd.) Price 4s., postage 3d.

Familiarity with the slide rule is by no means so common among practical engineers as it deserves to be, in view of its usefulness and speed of operation. This book clearly describes the use of the slide rule for all kinds of calculations, and a cardboard slide rule is provided in a pocket attached to the inside of the front cover.

PETROL ENGINE TOPICS

Simple Carburettors and their Limitations.

By EDGAR T. WESTBURY.

(*Concluded from page* 188.)

Suction Carburettors.

No matter how simple a device is in its actual construction, it has no claim to real simplicity if its manipulation becomes more difficult or calls for a great deal of skill. Many superficially simple carburettors involve very subtle working principles, which need to be fully understood if the best results are to be obtained from them.

Suction carburettors, in which the fuel tank is below the level of the jet, and which thus depend upon the depression in the inlet pipe

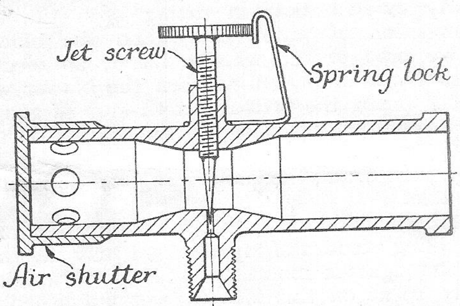


Fig. 2. A simple form of suction carburettor.

to lift their fuel, are by no means a new idea, as so many people seem to think ; actually they have been used in one form or another ever since the introduction of internal combustion engines. They have many very attractive advantages, among which may be counted the fact that they cannot under any circumstances become flooded or air locked ; these troubles are extremely prevalent in most other types of carburettors, and account for so many failures and stoppages. On the other hand, the simpler forms of suction carburettors are extremely "touchy" in adjustment, and their lack of compensation is very pronounced, so that, for a given setting, the extent to which they will tolerate changes in load is extremely small.

The device shown in Fig. 2 is essentially similar to one or two which are enjoying a certain amount of popularity at the present time for model aircraft engines, and it must be admitted that they work quite efficiently so long as they harmonise well with other features of the engine design, and that the engine can run at fairly constant speed. I have found that some engines will not tolerate them at all, and boat engines in particular do not seem to like them, on account of wide speed variations caused by propeller load.

The reason for their narrow speed range is quite easy to understand. In the ordinary type of carburettor the fuel is, as it were, waiting to be picked up by the air immediately suction takes place ; but in lifting the fuel, apart from the increased work which must be done by the suction, there is bound to be a certain delay after suction commences, before it actually issues from the jet. If suction were steady and continuous, this would not matter very much, but actually it is fluctuating and intermittent, depending very much on the type of engine to which they are applied. In some cases there is a period of reversed pressure, when the fuel is actually forced down the jet.

The ultimate result is that if the mixture is adjusted for a given load and speed, any drop in speed due to increased load results in weakening the mixture very considerably. Starting the engine from cold can usually only be effected by rather drastic strangling of the air supply.

In slow speed engines, it is possible to remedy this state of affairs by fitting the air intake with a valve, loaded either by gravity or a light spring, which has the effect of keeping the suction fairly constant, irrespective of the speed. (See the example illustrated in the issue of the "M.E." dated Jan. 29th, 1931.) This works very well in practice, but in applying it to a high-speed engine, the valve is found to have

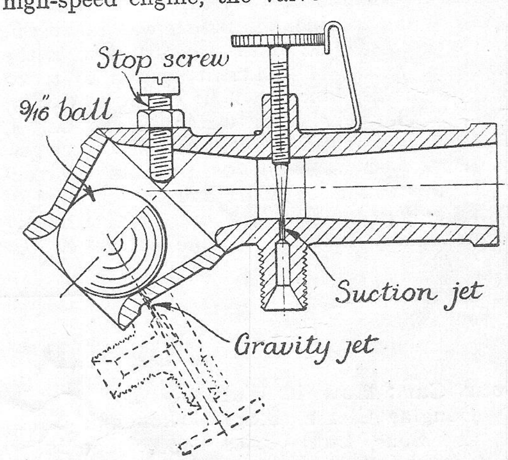


Fig. 3. Suction carburettor with automatic air control, also adaptable to gravity feed.

a throttling effect, identical with that of our old friend the mixing valve.

I have succeeded in minimising this effect by means of a simple ball valve, loaded by what might be termed "diluted gravity." The idea can be seen by reference to Fig. 3, which shows an experimental device made so as to be adaptable to either suction or gravity feed, for the purpose of obtaining comparative

results. With the object of reducing the throttling effect, the ball valve is not lifted directly by the suction, but *rolled* up an incline of about 30 degrees. It works extremely well in practice, and by the addition of an ordinary throttle, gives automatic correction over a good range.

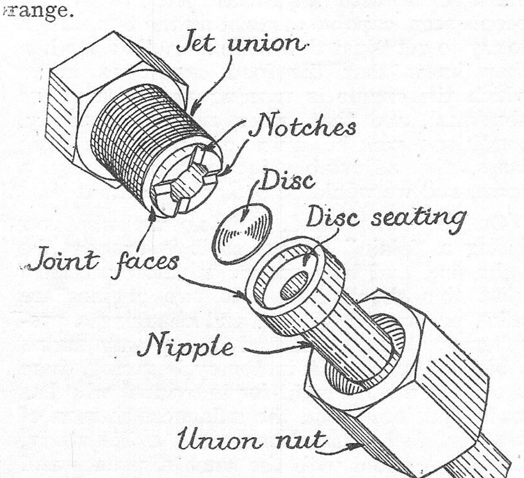


Fig. 4. Non-return or blowback valve for feed pipe o suction carburettor.

The subtle effects which may be introduced by comparatively slight changes in design, or even by a different method of feeding, are entirely overlooked by many model engineers, who often quite incorrectly assume that superficial similarity of appearance of two carburettors denotes identical properties. Take, for instance, the suction carburettor in Fig. 2. If, instead of having to lift its fuel from a tank below jet level, it is fed by gravity or pressure, its characteristics are diametrically opposite; that is, instead of the mixture weakening with a reduction of speed, it becomes enriched, and thus, like the mixing valve, it is over-corrected, but to a much fiercer extent.

Although this expedient has been exploited by one of the most famous, and certainly one of the most ingenious, of model speed boat designers, I do not greatly favour it myself, because, if anything, it increases the difficulty of finding and maintaining correct adjustment, and moreover, has the very undesirable propensity of completely flooding out the system, should the engine stop for any reason.

In view of the characteristics inherent in different simple carburettors, which produce under or over correction to order, it is easy to see that the use of two jets or complete carburettors with these opposing features might result in practically true correction. This certainly can be done more or less successfully, and the designer above referred to has very ingeniously adapted two carburettors which compensate each other, but it is too subtle and delicate a matter for the average user of model petrol engines. In passing, it may be mentioned that the well-known Zenith carburettor employs this principle. It should be remembered that in floatless carburettors, the error due to changes in level cannot in any circumstances be entirely eliminated.

Some engines which absolutely refuse to run nicely on a suction carburettor may be induced to do so by introducing a non-return valve into the fuel supply pipe. This will deal effectively with temporary reversals of pressure (more commonly known as "blowback"), but the valve action must be extremely light, as the effort required to operate it must be added to that required to lift the fuel, and thus too heavy a valve will prevent it working at all.

The type of valve I have found most satisfactory is an extremely light disc, which can be arranged between the two elements of a union joint in the manner shown in Fig. 4, the lift being restricted to not more than about 1/100 in., which is regulated by the depth of the recessed seating from the joint face, minus depth of notched spigot and thickness of the disc. Several materials have been tried for the latter, including metal, bakelite and paper,

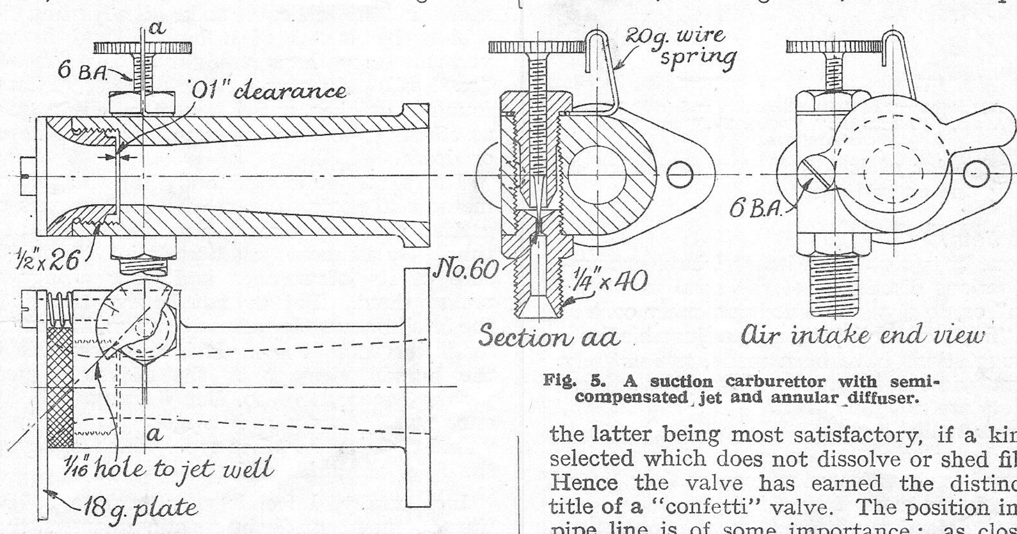


Fig. 5. A suction carburettor with semi-compensated jet and annular diffuser.

the latter being most satisfactory, if a kind is selected which does not dissolve or shed fibres. Hence the valve has earned the distinctive title of a "confetti" valve. The position in the pipe line is of some importance; as close to the jet as possible seems to be best for high-speed engines.

A Semi-compensated Jet Suction Carburettor.

The throttling effect of an automatic air valve cannot be entirely eliminated, so when maximum efficiency is necessary, an open,

straight bore must be employed. As is generally known, mixture compensation may be effected by control of either the air or the fuel, so in this case it seems very desirable to make use of a "compensated" jet. This, however, is easier said than done, as the usual methods of compensation do not apply; obviously one cannot use a "submerged" jet when the jet level is permanently well above the level of the supply. I have found, however, that some of the properties of the well jet, in which the jet is to some extent isolated from the fluctuating pressure in the main air passage, may be usefully employed.

The device shown in Fig. 5 is the result of my experiments in this direction, and it certainly seems to work very efficiently, both on two-stroke and four-stroke engines. It employs a jet and diffuser very similar to the other "Atom" carburettors, but has no control other than an air strangler for starting. No extravagant claims are made for this device, which has all the inherent defects of its breed, though (so I claim) in a much subdued measure. But bearing in mind the fact that it is quite immune from many of the vices which beset some of the more pretentious carburettors, it may be thought worthy of a trial; incidentally, by its

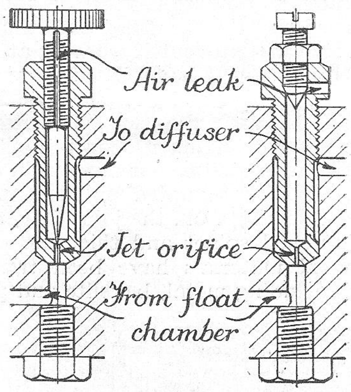


Fig. 6. Arrangement of (left) adjustable and (right) fixed jet in "Atom," "Mark III," "Mark IV," and "Baby" carburettors.

aid (and a lot of luck!) I have succeeded in winning one or two races.

Plain Jets.

In one or two quarters lately I have encountered serious discussion of the rival merits of "plain" or, to give them their precisely correct title, "fixed orifice" jets, and adjustable jets, and suggestions have been made, not entirely without evidence to support them, that adjustable jets are not only a snare and a delusion, but are actually incapable of producing so high an efficiency as the plain type. As one who has very largely used and advocated the adjustable jet in its many forms, it is considered up to me to defend my attitude on the subject.

Well, I will commence by saying that I think it only logical to suppose that the "plain" jet is considerably more efficient than the adjustable jet, if by efficiency we are considering its ability to deliver fuel with the minimum jet friction and suction. But this is by no means the same thing as engine efficiency, and the extent to which it affects the latter depends on very many factors in design. Most modern carburettors, even racing types, deliberately introduce jet friction to assist atomisation and compensation.

I will also say without hesitation that in the usual way there is far too much knob-twisting indulged in with adjustable jets; very few people seem capable of resisting the temptation to try to get "just that little more," even when they know that the load conditions under which the engine is running at the time are abnormal, and that, when running normally, conditions will be quite different. In such cases, the adjustable jet is undoubtedly a curse, and we would be better off without it.

On the other hand, it is no use whatever fitting a "plain" jet unless it is exactly the right size, and how are we to know precisely what this should be? No two engines are alike, no two fuels alike, and changing a propeller or altering the load in any way makes a big difference. In motor cycle racing, there is often a much-sought-for individual who has made "jet lore" (and the influences thereon of weather, fuel, gear ratios, etc.) a life study, and is consulted with the same reverence and confidence as the local weather prophet. Something of the kind is badly needed in the world of model power boats and aircraft; there is at least one man among us who is a perfect wizard at selecting the jet for the occasion, but the ability is very rare indeed.

In the circumstances, I do not feel justified in recommending all users of small petrol engines to scrap their adjustable jets and fit plain ones. The former can be extremely useful if adjusted with a modicum of intelligence, and I know of more than one case where the fitting of an adjustable jet has enabled a higher performance to be attained in certain hands. Speaking for myself, I have grudged the time spent in the delicate task of adjusting jet orifices by means of a broach, and in my versatile (or perhaps it might be called merely "restless") adventures with engines, I have found it quicker, and I honestly believe quite as effective, to do it by screwing a needle up or down.

The plain jet is essentially for the patient methodical engine tuner, who concentrates on getting the very utmost from one engine at a time. By all means use a plain jet, if you feel sure of its advantages and your ability to realise them. But do not believe that it is the infallible cure for all carburation difficulties, for it certainly is not. It is as susceptible to the human element as the adjustable jet; perhaps even more so, but its immutability, once fitted, does give it a more positive individuality than the other type, which is always the slave of human whims.

Incidentally, I feel it very hard to believe the statement made in certain quarters, that once the correct jet size is fitted, it is invariably right, irrespective of temperature, humidity, etc., so long as the same fuel is used. This is contrary to all my experience with larger engines, and in view of the physical laws which govern the variation of jet output, I should expect these effects to be more pronounced in small engines.

One more point on this subject: the round hole in a "plain" jet, and the annular orifice of an adjustable jet, have totally different discharge coefficients, and some rather unexpected changes in engine performance may result from changing over. The adjustable type usually has some slight tendency to compensate itself, which is lacking in the plain type. I find that in the "Atom" compensated jet carburettors, a plain jet works very well if arranged as shown in Fig. 6, but requires a much greater air leak to the jet well to give good correction than the usual (adjustable) jet.

In two-stroke engines using "petroil" lubrication, the different jet characteristics are still more pronounced. Many users of these engines have found that they can get the effect of a variable jet by discreetly "wangling" the proportion of oil mixed with the fuel; but the requirements of adequate lubrication, and keeping the sparking plug clean, limit strictly the extent to which this can be indulged.

Electricity for the Country House Estate.

By A. H. AVERY, A.M.I.E.E.

(*Concluded from page* 181.)

Storage Capacity.

All engine-driven isolated generating sets depend very largely for their utility upon the accompanying battery of accumulators, in order to deal with light loads at such times when there would be insufficient demand to justify running the engine. The convenience of this arrangement is without question, but it introduces a feature which is not so desirable, that is, the high cost of the battery, unless the number and size of the cells is rather seriously restricted. If the battery capacity is too small, it naturally means more frequent running of the engine to keep up the charge, while any reduction in the number of individual cells making up the whole battery involves working at a relatively low voltage. Low voltages demand such heavy currents to convey any appreciable amount of power that the cost of the wiring and cables, if they are of adequate size to carry the current without undue pressure loss, becomes a very serious item in the capital outlay.

Choice of Voltage.

Most of the smaller sized petrol-electric sets intended for restricted areas of supply, such as house lighting on a small scale, and perhaps the addition of one or two lights in adjacent outbuildings, are designed for either 25 volts or 50 volts, with 13-cell and 26-cell batteries respectively. It is very seldom that 110-volt systems with 57-cell batteries are to be found.

Low voltage schemes may answer perfectly well for lighting a compact area where the extreme length of the wiring is not too great, but they are totally unsuitable for small estate work, where it may be necessary to convey the current several hundred yards away to a chaff-cutter motor, for instance, or a dairy churn. A half horse-power motor, for example, which will require about 600 watts input to develop full power will, on ordinary commercial voltages such as 230 volts, take a full load current of 2.6 amperes only. On 110 volts the current would rise to 5.45 amperes to do the same work. A 50-volt motor of the same power would consume 12 amperes, while on such low pressures as 25 volts the current would be no less than 24 amperes.

Cable Sizes.

Translated into terms of cable sizes, the significance of the above becomes at once apparent, for whereas a 1/.036 cable will suffice to feed the ½ h.p. 230 volt motor, the cable would have to be increased to 1/.044 for a 110 volt system, to 3/.036 for 50 volts, and to 7/.036 for 25 volts. A single glance at the cable makers' lists is sufficient to bring the point home that the voltage selected for the installation is a matter to be carefully studied, if one does not intend to sink the greater part of the capital outlay in cumbersome and expensive cables and wiring.

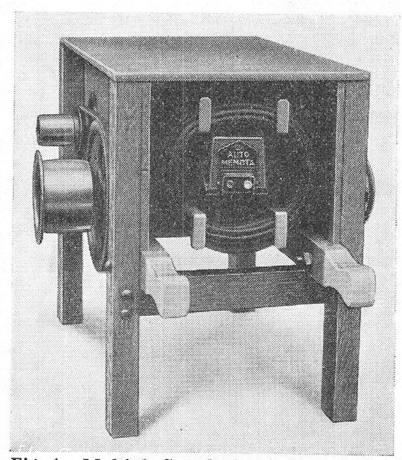


Fig. 4. Multiple Speed Electric Power-Box.

Pressure Losses.

The loss of pressure in volts along the line is also another point to be taken into account. With the cable sizes above mentioned, there would be normally a loss of one volt for every ten yards traversed by the full-load current. This forms a very much larger percentage of loss in the low voltage schemes than it does in the higher voltages. On a 230 volt supply, for instance, the volt-drop in a hundred yards of cable supplying the ½ h.p. motor, taken as an example, would be 10 volts, that is a loss of 4.35 per cent., which is not serious. But the same motor if supplied from a 25-volt transmission scheme, and with the same loss

of pressure along a correspondingly larger cable, still loses 10 volts in 100 yards; but this now represents a loss of no less than 40 per cent. of the total pressure of supply, which would leave quite an inadequate pressure at the terminals of the motor to enable it to develop its rated output.

Some prominence has been given to these facts, because they are not always fully realised when considering the installation of isolated self-contained generating sets. A low-voltage set might be quite satisfactory for lighting a small farm house, if restricted to lights alone, but in the case of a small country seat intending not only to undertake house lighting, but also to cope with the distribution of heavy currents for farm purposes, for dairy work, or electro-culture even on a small scale, the higher the pressure of the supply, the more practicable will the scheme become.

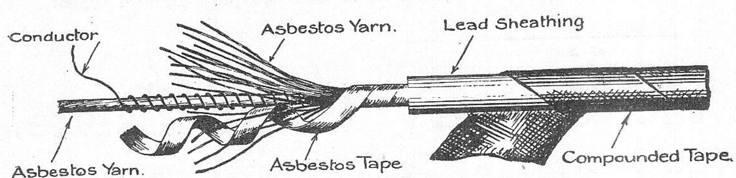


Fig. 5. The construction of a Soil-heating Cable.

Electricity on the Farm.

By the aid of electric supply, there are many farm operations that can be carried out with a convenience and rapidity that was formerly quite impossible by manual labour. At the present time there are over seven thousand farms in various parts of Great Britain taking advantage of this fact, and making use of that exceedingly mobile and flexible power unit, the electric motor, probably the handiest of all electrical appliances.

The uses of a motor are almost endless, both indoors and out; opportunities for its economical use occur in the dairy as well as for all odd farming operations. It will drive threshing machines, chaff cutters, root cutters, cake breakers, operate corn grinding and crushing mills, hay elevators, circular saws, grindstones, pumps, shearing and clipping machines, etc., etc. In the dairy it will find numerous uses for milking, separating, churning, cooling, bottle washing and such duties, with a cleanliness and flexibility unattainable by any other means.

Again, the poultry farmer can make unlimited use of electrical power for heating, sterilising, for incubators, and for artificial lighting as an incentive for "intensive laying" of eggs, by working the chicken overtime under the impression that the days are longer!

Pumping, one of the most laborious of tasks, is more conveniently dealt with by an electric motor, relieving manual labour for other duties less irksome. One of the handiest of the many forms of mobile power units is the "Electric Power Box" made by Abell and Smiths Electric Power Co., Ltd., of Worcester. Its appearance is shown in Fig. 4, and it embodies a weather-proof electric motor in a carrying crate having three projecting pulleys at the sides, each one of which is driven by the same motor, but runs at a different speed from the others. This enables the speed most appropriate to the work in hand to be selected for belt-coupling to the machine which has to be driven. A power unit like this will drive pumps, root-cutters, churns, grindstones, shearers, etc., and being perfectly portable, it can be taken to the job itself wherever it happens to be located, when, by means of the flexible cable and starting gear provided with the set, it is then plugged into the nearest power point without the need of any intermediate countershafting, since one or other of the three pulleys is sure to give a sufficient approximation to the desired speed for operating the machine to be driven.

Electroculture.

In the province of market gardening, one of the latest electric developments is the production of "soil-heating" cables, for forcing the growth of vegetables or flowers.

Whether on a commercial scale or for private use the beneficial effect of carefully regulated heat on plant growth is too well known to need stressing. The initial cost and constant attention demanded by ordinary methods of furnace-heating in the frame or greenhouse can now be entirely avoided by using a self-regulating soil-heating cable buried in the ground below, which can be combined with an automatic heat regulator or thermostat, set to control the exact amount of heat desired to the greatest nicety.

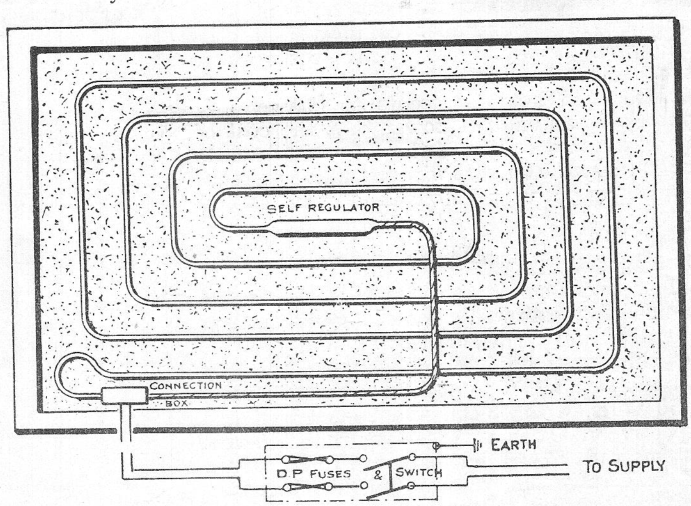


Fig. 6. Arrangement of Soil-heating Cable and Thermostat in Garden Frame.

The make-up of such cables is illustrated in Fig. 5, and the method of installing them in a heating frame is shown in Fig. 6. In setting up the frame, a good bed of coke breeze or cinders is first laid down to a depth of about

six inches, to provide necessary drainage and assist heat insulation. This lining is also banked up at the sides of the frame to within a few inches of the top, for the same purpose. The heating cable is then laid over this, either in zigzag form or in rectangular loops, as in Fig. 6, and is next covered with a layer of sand about one inch thick to assist in uniform heat distribution. Over this a strip of wire netting should be laid to prevent possible damage from disturbance of the cable, and finally soil is added to a depth of six to nine inches.

Soil-heater cables are generally made up in 10 yard lengths complete with thermostat, and are obtainable from Messrs. Siemens Bros. and Co., Ltd., of Woolwich, S.E. About four to eight watts per square foot of frame surface is generally sufficient. The 10 yard cable lengths take about 200 watts each, and if more are required for larger frames, they can be easily added in parallel with the first.

First Steps in Model Engineering.

Workshop Advice, Experience and Philosophy for Readers of all Ages.

By "INCHOMETER"

Ill-treating Tools.

Probably the correspondent to whom I have given, and with genial and respectful intent, the appellation "Whopping Cuts," had not conjectured the wide interest aroused by his simple enquiry. He may deservedly enjoy a satisfaction in having "builded better than he knew." For my part, he has given me the pleasure of having from his pen a further extensive letter, so replete with interest and intelligent reasoning, that I cordially thank him for a real mental treat. Evidently he now has an understanding which, in conjunction with the further evidence incorporated in my last article and the assistance generously offered by correspondent B, will clear away his difficulty of obtaining heavy cuts with his lathe. He realises that for heavy cutting, the tool should not project excessively from the slide rest, and if the work is held in a chuck, it also should project only by a comparatively short amount.

Beyond deriving benefit to himself, however, his enquiry has elicited a number of letters, which definitely indicate that many beginners at turning are in similar trouble, and will be helped out of it through the information sent by various experts. But in compiling, with the kindly assistance of readers such as A and B, evidence of ways and means to effect heavy cutting with small lathes, have I "raised a demon" of ill-treatment to such lathes and similar machine tools, when manipulated by inexperienced users? For example, the gun-metal shaving in photograph Fig. 2 of my previous article, was cut with absolute ease by the operator and by the lathe. But Mr. G. S. Willoughby, of locomotive "Peter" fame, is a trained skilful mechanic and accomplished model engineer, thoroughly understanding the capabilities of tools. Also, correspondents A and B, I judge, by the appearance of the specimens they have sent, which are shown in the two photographs. Not one of these mechanics, I am sure, would strain his lathe or stress material by heavy cutting. He would so adjust the manipulation of the tool, in conjunction with speed of the work and sense of the grade of material, that neither tool or work suffered by stress of cutting. The depth of cut might be considerable, but the cutting would be easy. There is an art in cutting glass with a glazier's diamond, there is an art in cutting cork with a knife, "fools' haste is nae speed." Three components for heavy cutting in a small lathe are knowing how, knowing why, and knowing when, plus kindness to the puir beastie itself.

Examining a Second-hand Lathe.

Like unto heavy cutting, how to judge a second-hand lathe is a matter of perplexity to many home workers in model engineering. An instance which may be regarded as typical is afforded by a reader in Weston-super-Mare; he desires to know what is likely to be wrong with a second-hand lathe, how he can test one, expressed by his own words, "How can I give a lathe the 'once over' to see if it is worth the price asked?" Let me appeal to those skilled and experienced mechanics who afford a so welcome compliment and assistance by reading my articles, and lending to them the benefits of independent advice and experience. Gentlemen, would you rate me as being anything much of an engineer and mechanic if I presumed and attempted to qualify my correspondent for his object by a few lines, or even pages, of writing?

Here is a true story relating to myself. Several years ago I was engaged in a visit of inspection to the factory of a maker of small lathes. It was a large workshop, situated in a Northern town, world-famous for engineering products; the plant comprised a number of first rate machines, some specially contrived for the purpose of the works. The lathes made were of really good design and quality in all respects, and sold at a range of moderate prices. Now I wish I had bought one, but they are off the market; we all accumulate regrets in passing through our life. The maker permitted me to inspect everything, and explained and demonstrated all the methods and means used to verify the accuracy or otherwise of the components and the completed lathes. These were well devised and excellent. At the conclusion he remarked, "you have seen all our methods and tests, and noticed the accuracy of our work; if I had cared to do so, *I could have deceived you every time.*"

The wise course would be, have a friend with you, one who has some actual experience with a lathe and turning, to examine the offered lathe and advise upon its apparent condition and quality. When you have seen that the points of the centres meet, tested with the tailstock barrel in and out to full extent, tried

the mandrel to ascertain if it shakes in its bearings and if it will rotate evenly without a sticky place, tried all movement screws and slides for slackness, examined the nose screw for condition, removed the mandrel to ascertain if the bearings are worn or cracked, looked around gear wheels for broken teeth, examined the lead screw, if a screwcutting lathe, and the guide nut, for wear and shake, generally surveyed the condition to form an opinion if the lathe has been badly used or carefully treasured, listened to the talk of the seller, and sensed whether he is sincere in his statements, you may still have deceived yourself "every time." Your friend may also deceive himself and you, in good faith.

When buying a second-hand article you cannot be sure that there is no defect or lurking result of mishap, perhaps unknown to the vendor. You must take a chance. If you buy a new lathe, the reputation of the maker or the dealer supports the transaction. Regarding price, read the "Sales and Wants" columns of THE MODEL ENGINEER to obtain general information about values of second-hand articles obtaining at the moment. Circumstances often determine price; human nature in the main is honest, rather take the seller into your confidence than be suspicious that he means to cheat. Read my remarks about buying a lathe published in the issue of 11th October last year.

Fitting a Self-Centring Chuck.

The same correspondent desires to know whether a beginner should attempt to fit a self-centring chuck, and if the work can be done by the same lathe. Method and operation are fully described, with illustrations in THE MODEL ENGINEER, of 18th May and 22nd June, 1911, volume 24, under the heading "Practical Lessons from the Workshop"; these issues can probably be obtained from the Publishing Department, but the price of back numbers of journals is usually increased. It is possible to machine the adapter plate and fit the chuck by the same lathe, provided you have means, maybe the lathe itself, to drill the centre hole, and those for the attachment screws. Preferably have the chuck fitted by the lathe maker or other skilled assistance; considerable knowledge is required in properly fitting chucks of any kind. You will find the article I have mentioned very informative and helpful; it was compiled by a lathe expert.

Amateur Blacksmithing.

Another enquiry, "Please tell us something about forges and smith's work. This branch is very much neglected, so is sheet metal work, and I am sure that both of these branches of engineering are productive of useful articles." Excepting an occasional shaping of tools, model engineers do not practise blacksmithing. Bending and straightening heated iron and steel are common operations in general home work, the trivet, for example, described in my articles of 18th and 25th April, but making forgings is not usual with home workers. One objection is noise occasioned by hammering metal upon the anvil, which alone would preclude smithing in many places. My correspondent will, however, obtain some guidance from a book, "Practical Hand Forging," by Captain Twelvetrees, price 10d. post free from THE MODEL ENGINEER Publishing Department; a book dealing with sheet metal work can probably be obtained also through the same medium, several have been compiled by various authors.

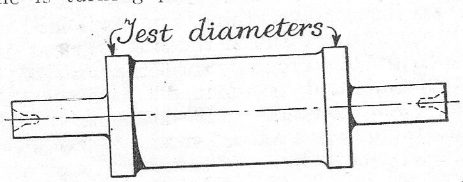
Correction of an Error.

Several letters are waiting my consideration; I thank the writers and assure them of my appreciation and intention to think over the contents with a view of utilising such portions as may appear serviceable. Correspondent B of last issue, in one of these, acknowledges the figure .0005 is a slip, it should be .005, for the thickness of the copper foil mentioned. No disgrace, friend B, "The man who has never made a mistake has never made anything."

Workshop Hints and Gadgets.

Setting Lathe to Turn Parallel.

When turning a job between centres, it is necessary to test it with a micrometer at two positions a fair distance apart, to see if the lathe is turning parallel or not. This hint



will save considerable time, and it should be used on every job of this nature, because when resetting the tailstock at different positions on the bed, it will be found that the lathe will not always cut dead parallel. Take a roughing cut along the centre of the job, as shown in sketch, leaving about ½ in. each end; light cuts can now be taken over these two portions, tested with the micrometer, and the tailstock adjusted as desired, until the lathe cuts dead parallel or near enough for the job in hand.

J.H.D.

Packing Glands on Model Engines.

I have found in packing model glands that instead of having the packing in a long length, and threading it to and fro round the rod, it is much better to wind the packing round a piece of brass wire the size of rod being packed, and with an old safety razor blade, cut through packing parallel with rod. There is now a series of small rings of packing which are easily placed in stuffing box with a pair of tweezers. Push packing into box with a piece of bent wire, of course, keeping joints in packing opposite each other, or, as we say in big work, break joints.

C.H.C.

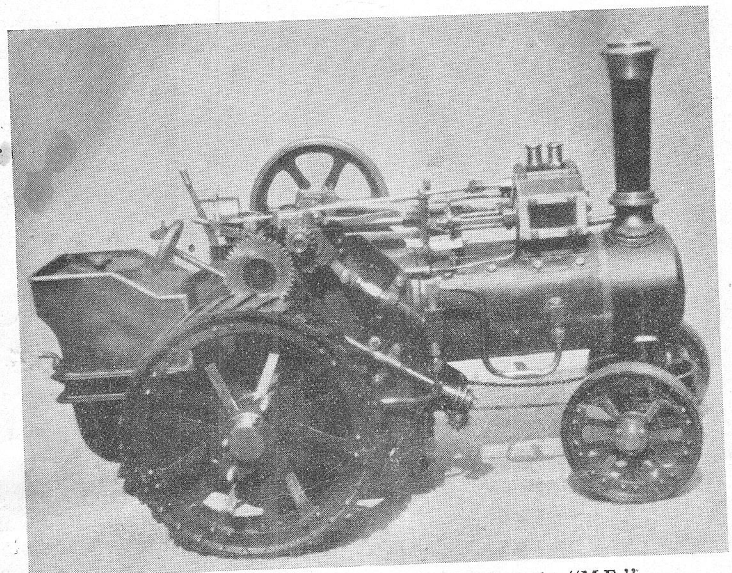
A 2/3 in. Scale Model Traction Engine.

By F. DAY.

THE presentation blue print and series of articles on the construction of a traction engine by H. Greenly, in the January 5th, 1933 "M.E." fired me with a desire to build one, but my lathe being only a 2 in. Patrick, I could not build a 1 in. scale model. I considered using the blue print as full size, making the model ½ in. scale, but found that this would be a bit too small.

The sight of a piece of copper tube 2 in. diameter, which a friend had given me, suggested a compromise, so I made the engine ⅔ in. scale, and used the tube for the boiler.

The boiler is coal fired and contains six 5/16 in. tubes, and was brazed up. It was tested to 150 lb. per sq. in., and showed no sign of weakness. The fittings are blower, water gauge and pressure gauge on back-head, and two clacks for pumps.



A 2/3 in. scale model traction engine built to the "M.E." design by Mr. F. Day.

The cylinder block was machined up from a piece of hard brass. The two cylinders are ⅜ in. bore × 9/16 in. stroke. All steam passages are drilled in the block, no outside pipes being used. The steam ways are No. 48, and exhaust ways 3/32 in. This was a tricky job, for there was very little room for the drill to wander. Between the bores runs a 5/32 in. hole direct into the boiler to pass the steam to the regulator box on top. The cover of this chamber contains the two safety valves.

The cylinder block was screwed and sweated to a brass plate curved to fit the boiler, and attached to this at the back end was the motion plate. This plate was bolted to the boiler, and a fillet of soft solder made it steam tight.

The motion plate carries the reverse shaft, and has two bushes brazed in to support the valve rods. Reversing is by Stephenson link motion. The crankshaft is built up and brazed, and the scrap box yielded a piece of brass tube for the smoke box and another piece for the funnel, with a larger section forced on for the ornamental ring. The door ring and door were turned from aluminium. The door is hinged and has a correct dart locking.

The side frames are drilled to fasten over the boiler stays, which were left long to allow for this. They are bushed to carry the axles for the train of gear wheels.

Before going any further, I thought I would see what success had attended my efforts up to this point. I fitted a pressure gauge from a tyre pump; this only read up to 40 lb. Steam was raised in 4 minutes, and on this low pressure I was surprised at the power developed, and the exhaust was sharp and snappy. Holding the finger on the rim of the fly-wheel provided a splendid display of fireworks from the funnel.

The Road Wheels.

The rear rims of these were 1 in. sections of water main 4¼ in. diameter, they were recessed at each end. Sheet brass rings were then sweated into the recesses, giving the double T girder form. The hubs were made to Greenly's design, and brass spokes sweated to the hubs and riveted to the brass rings. The strakes were ¼ in. × 1/16 in. mild steel strips riveted on, a very tedious job.

The front wheels were made the same way from 2 in. pipe sockets, but have only 1 brass ring.

The scrap box provided the parts for the spud pan and steering gear. The chain has provision for taking up slack, being silver soldered at each end to pieces of 1/16 in. rod. These pass through eyes on the spud pan and are tensioned by 10 B.A. nuts.

I now had my traction engine on wheels, and the next problem was to fit up the train of wheels to drive it. An S.O.S. to all my friends for small cog wheels brought along a large and varied assortment, from which I was able to arrange a drive which did not foul any of the boiler fittings. The first driven shaft moves sideways out of mesh, to allow of a free engine drive.

The tender was made from sheet brass and carries the hand pump. On the side is a screw brake working in a groove on the winding drum. Two rollers allow the winding rope to be taken "round the corner." To use the winding rope, it is only necessary to remove the two driving pins from the road wheels, which are free on the axle, but prevented from

coming off by a nut and washer at the ends of the axle, covered by the hub caps.

When I came to set out all the controls on the "footplate," I found I could not arrange for a pull-out regulator as I had at first intended. This was a nasty blow, for the regulator valve in the steam chest was all fitted up, and any alteration there did not seem possible without practically dismantling the cylinder block. One day, however, whilst riding my motor cycle, I noticed that the twist grip throttle control overcame exactly the same difficulty, and my problem was solved.

The regulator handle is fixed to a piece of $\frac{1}{8}$ in. rod which rotates in a tube, a pin, however, is working in a slot cut in the tube like a very coarse thread. As the handle is turned in an anti-clockwise manner, the pin runs along the slot and pushes the rod along the tube. A 1/16 in. rod connects the $\frac{1}{8}$ in. rod to the valve spindle through a knuckle joint. As the valve is an ordinary D type with a nut, the small turning movement of the spindle does not matter.

In spite of its small size, this model was very easy to build, and did not present any serious difficulties in its construction. It was completed in nine months, and the only parts purchased (with the exception of the sheet metal) were the casting for the flywheel, and the pressure gauge with which it is now fitted.

The model was exhibited at the Nottingham Model Engineering Exhibition, 1934, and was awarded one of the Oaks-White Cups. It ran for a total of 23 hours on the compressed air bench.

The photograph gives an idea of the appearance of the result of my first effort in model-road locomotive construction. It is 11 inches long, 8 inches to top of funnel, and 8 inches over hub caps.

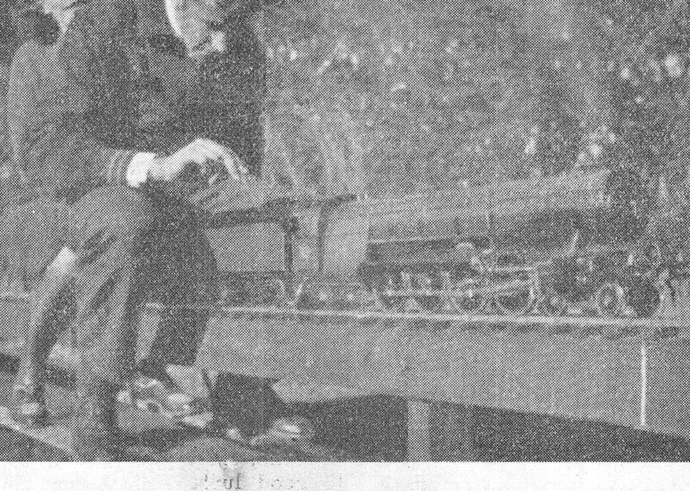
SHOPS SHED & ROAD

A Column of "Live Steam."

By "L. B. S. C."

Another Good Job Done !

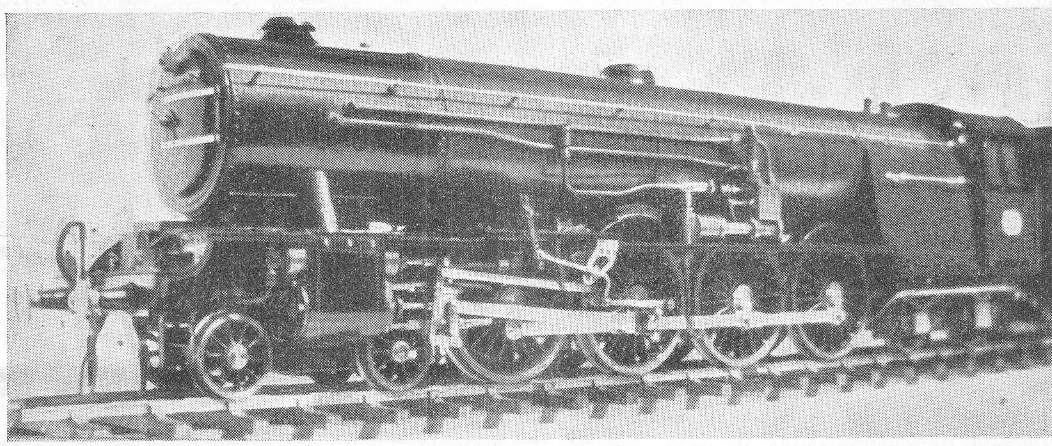
Our worthy brother the Rev. C. Rought Jenkins, of Zastron, South Africa, has now finished his $2\frac{1}{2}$ in. gauge 4-8-4 locomotive "Eusebius," and here you see the bus. Some bus, too, at that! Notes on her general construction were given some time ago, and the photos show a few of the blobs and gadgets. On the running-board on the "platform side" of the engine can be seen the mechanical lubricator and the horizontal Weir type pump. The latter is as described in the Live Steam notes, except that friend Jenkins has put the steam and pump cylinders closer together for neatness sake, and fitted a larger lubricator with an adjustable feed, as the original one only held enough oil for about fifteen minutes' running. This is, of course, a decided advantage, and a big lubricator is preferable to a baby one any time, so long as you don't object to the outsize appearance. Several brothers who have fitted these pumps to their locomotives—vertical pattern as described in back notes—have placed them on the running-board just in front of the cab, and hidden up a Bill-Massive-size oiler in the front corner of the cab, out of sight. A very good wheeze, that. Bro. Jenkins says he had some little trouble getting the pump to work at first kick-off, but it is now O.K. and a self-starter every time, working evenly with a sharp little exhaust beat; a delight to see and hear!



"She flies up the bank with the greatest of ease—"

The Zastron L. Ry. is at present 108 ft. long; first thirty feet are level, but then comes a sixty-foot bank of 1 in 50, with the

rest level again. When performing, steam is raised from all cold in five minutes, and the usual preliminary light run to "warm her up" is given. Going down with a load, all she needs is a mere crack of throttle to run her over the top of the bank, down which she will coast freely, and another whiff of steam then carries her to the far terminal. Coming up with a single twelve-stone passenger, plus a 28 lb. flat car, she will race up the 1 in 50 bank with half throttle and the reverse lever just off mid-gear—*inside* the next notch to centre; and this performance can be repeated *ad infinitum* with the safety-valves on the buzz all the time. With a total weight of 350 lbs. behind the tender, and a taste of sand on the rails, she will snort up to the top mixture of house coal and anthracite, which forms clinker, so that the fire needs cleaning after about $1\frac{1}{2}$ hours' work. Friend Jenkins says he wishes he had a few cwts. of good Welsh steam coal at Zastron. Up to the present the engine has put in over one hundred hours of actual running since completion, and seems to get better every time out. Every run is usually done before a fascinated audience of anything up to fifty people, the sound of her whistle bringing half the dorp to the scene. The mechanical lubricator, made to "Live Steam" instructions, gives every satisfaction, and our worthy friend says it is a treat to be able to keep the engine running and know she is getting the oil all right. When working heavily, two adults up



"—and here you see the bus."

of the bank with no vestige of a slip; friend Jenkins says the exhaust beats sound like the crack of doom! If started from the bottom of the bank with a good fire, before she is half-way up both valves will be blowing off hard against full throttle, full gear, donkey pump working, mechanical pumps full on, and even wiggling the hand pump lever won't stop her; and our worthy Rev. brother says if that isn't the gospel according to Live Steam, he'd be glad to know what else any critic might expect. Naturally the coal and water consumption is heavy under such circumstances, and there is a firework display from the chimney; but you can't have unlimited steam production without boiling water away, and burning coal to boil the water. However, it is seldom necessary to drive the engine "all out" like that.

With three kiddies aboard, she will run several return trips on one firing, working well notched up, and the water consumption is then very moderate. Her maximum haulage has not yet been ascertained, as the car will only carry three adults; she just laughs at these on the level, but cannot quite manage them over the full length of the 1 in 50 grade, as she cannot get sufficient run at it for a load approximating to 2,700 tons in full size practice, which no full-sized locomotive could handle unaided over a grade of similar inclination.

The above performances are made on a the bank every time, the lever is adjusted to feed one pumpful every twenty-one revolutions of the wheels; but with one passenger only, or a few kiddies, she is let down to a pumpful every forty-two turns, and still gets sufficient, so that one filling of the lubricator will last anything from two to three hours. The oil used is Vacuum 600 W.

Several "full-size" drivers of the South African Railways who live in Zastron take a busman's holiday at the throttle of the little engine, and have the time of their lives; needless to say, whilst she was under construction, there were plenty of sceptical and "incredulous" remarks flying around when her probable performances were hinted at—but seeing's believing, and there are no sceptics now!

Our Rev. brother, having made a success of his first attempt, is now seeking "fresh worlds to conquer," and has decided to tackle both a four-cylinder "Kingette" and a "Dyak" with Baker gear. Being especially interested in valve gears, he is making these first, saying he enjoys nothing more than making little fiddling parts and putting them together. Blessed if I do! But there—'tis just the way of things, as my correspondence testifies; some like machining best, others like fitting, yet others again prefer boilers and plate work. Anyway, here's congratulations on a good job well done, and the heartiest of good wishes and good luck for the next venture.

She Looks Right—And is Right!

On the evening of August 7th last, one of the finest examples of small loco. building that it has been my pleasure to see, made its first trial run over the Polar route. The engine is a "Fayette"-type "Pacific" with flat-sided tender having British type bogies, and is the handiwork of Mr. T. H. Glazebrook, of Thornton Heath, who hides under his genial personality an inexhaustible store of skill and patience. The works of the engine, also the boiler, are to "words and music"—but the "music" is of the Queen's Hall type, inasmuch as the motion work, connecting and coupling rods, etc., are made from stainless steel, the combination levers, valve rods and eccentric rods being fluted. Every part is correctly shaped, perfectly finished and fitted; not a slack joint anywhere; even the firehole door is a "work of art" as you might say. Bro. Glazebrook enlisted the services of another local fan, Mr. D. J. Metcalfe, to help him carry the doings around, and we steamed her up, the usual 3½ minutes being taken from all cold, my electric blowing gadget providing the necessary breeze. The safety-valve springs were set rather light, so that she blew off at a little under sixty pounds; yet after a couple of light trips she started passenger-hauling, and proved herself to be as good a runner and hauler as she was a good-looker. With two cars behind the tender, carrying a total load of 533 lbs. of "live meat" plus the weight of the cars, she had no trouble in starting from either end, and would notch up almost to middle, with the safety-valves popping away the whole time, and the exhaust beats coming out with the sharp snappy deep-toned crack of the genuine "Live Steamers." Much of the running was done with the firehole door partly open. This engine has a mechanical lubricator of the twin-opposed type as described in these notes, and friend Glazebrook has improved the ratchet gear by extending the tails of the pawls and fitting tiny spiral springs to them, the faint clicking of the pawls being distinctly audible when the engine is running with steam shut off. I hope to be able to show a few close-up photos of this engine as soon as the final details are finished off.

The Harrison-"L.B.S.C." Experiment.

Well, friend Harrison has told his story, in August 8th issue; I can now write the "epilogue"—one day there may be a sequel. The proof of the pudding is always in the eating; and the outstanding fact in the case in point is that the engine now does 30 per cent. more "mileage" on the *same* amount of fuel and water than she did before I gave her some kind attentions, this improvement being made by altering valves, ports, etc., to obtain as near as possible the "monkey gland" effect with the existing valve gear. The latter was treated as mentioned in Mr. Harrison's article. One of the jobs I did to it was to make the engine run the same way as the lever was set; previously it ran backwards with the lever forwards, and *vice versa*.

As Mr. Harrison stated, the difficulty was to make the tiny amount of steam exhausted at such lower pressure after expansion, provide sufficient draught to keep the burner working efficiently, with the existing boiler and casing. Methylated spirit needs a large amount of air to ensure complete combustion, and the arrangement of the boiler in question made a reasonable amount of blast absolutely essential. Before I had her, she was using sufficient steam to provide it; afterwards, it was "touch and go" whether the reduced consumption could be made to do the trick without nozzling down to an extent sufficient to cause back-pressure, and so neutralise the good results. I don't think Mr. Harrison will be able to go much smaller in nozzle diameter, without "touching bottom" as you might say, and have suggested that he tries an extra liner in the chimney; but here again it is a case of "ganging warily," because if the chimney is too small in the bore, it will not pass away the burnt "fumes" or products of combustion even with increased draught, so we're in the soup once more.

Had I built the locomotive, I should have made the arrangement of boiler, casing and tanks very much different to what it now is, so that heat losses, as well as steam consumption, would have been cut to minimum; and I could even now alter the whole bag of tricks so that sufficient draught could be produced with the smaller of the nozzles I gave Mr. Harrison for testing. I have altogether five more tricks up my sleeve, which if applied would, I honestly believe, further increase the mileage run on one filling by another two or three laps.

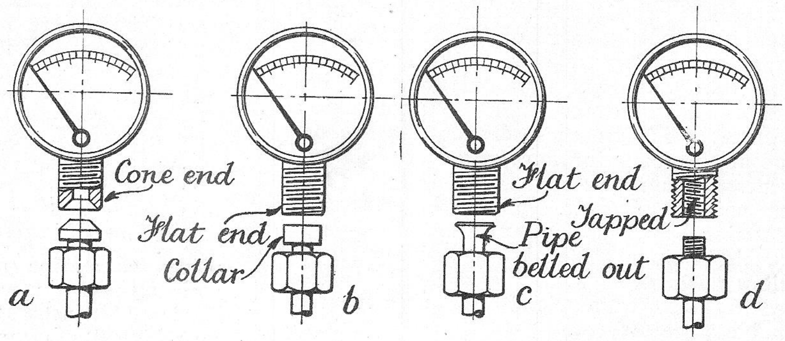
Friend Harrison's concluding paragraph is sound reasoning and good "horse sense"—it *is* exceedingly risky to be dogmatic about theories; but there is no dogmatism about a plain statement of proved facts, and deductions based on them are far and away above theory level. His opinion that cylinder bore and stroke might be determined by given boiler capacity is quite O.K. (it was by finding out how much steam I could get from the boiler, and arranging new cylinders and motion to suit, that I have rebuilt many "duds" into good engines), but there is another factor to consider, viz., maximum power required. I have got just as good results from a repaired locomotive with fairly small cylinders as with a large cylindered one, *with a given load* (there's the rub!), but the small cylindered gadget has had to work at, say, 100 lbs. pressure against the other's 65 or 70 lbs., and whereas the former had nothing in reserve, the latter had a whole heap. Friend Harrison's engine as it is now, with large cylinders, will haul my weight quite well with 70 lb. pressure; and if it had an axle-dodger oil-burner in place of the spider-exterminating apparatus which now keeps it hot, it would keep on doing it until the cows came home, or until the lightly-made valve gear gave up the ghost. If, however, the cylinders were only ⅜ in. or 7/16 in. bore, it would need 70 lb. or so to haul Mr. Harrison's light six-car train around his track,

especially up the banks, and whilst it would probably run the seven laps on one filling, with the present valve setting, there would be nothing in reserve at all. It certainly wouldn't pull me. As things stand, if he wants to run a miniature "cheap excursion" or "race special" or something of the sort, and puts on twenty cars, the engine just does the job with no trouble; it would, of course, cover less mileage at a filling, as more steam (and consequently fuel and water) would be needed to haul the extra coaches. With small cylinders, the steam pressure needed to shift the extra load would be so high that in all probability the spirit burners wouldn't be able to furnish sufficient heat to generate it.

The large v. small bore cylinder argument will probably keep on until the Statue of Liberty dives off her pedestal and tries to swim up Niagara Falls; but the naked truth is as agreed by friend Harrison — that because cylinders are big, it does not follow that the boiler *must* be big also; a small whiff of steam can push at a big piston and do the job in a perfectly satisfactory and economical manner. So there I'll leave it!

A Note on Fitting Steam Gauges.

One brother complains about the "untidy" appearance of a steam-gauge syphon with a little tail pipe fixed in the top of it, whilst another says he melted up the tail pipe altogether when trying to silver-solder it in position; both, plus a few others, want to know how I fix them. In four ways: (a) Drill nut to fit syphon, silver-solder a suitable cone direct on syphon, and countersink gauge stem with Slocomb to match, making an ordinary union fitting. (b) Silver solder, or screw and soft-solder, an ordinary flat collar, made of a thin slice of copper tube, on the end of the syphon, in place of the cone. (c) Drill nut as above, slip over softened end of syphon, and bell out with a piece of tapered rod, or end of centre-punch. Belled end is clamped tight against gauge stem when nut is tightened. (d) Especially applicable to Bond's ¾ in. gauges. Tap the hole in stem ⅛ in. by 60, and screw the end of the syphon to suit, putting a taste of Bosswhite jointing paste on the threads. Drill out nut, and use same as gland nut, only no packing is needed. All the above methods look neat, and dispense with the ugly tail pipe joint.



How to fit steam gauges direct to syphons.

Altrincham Model Power Boat Club 1935 Regatta.

THE second annual M.P.B.A. Regatta of the Altrincham Model Power Boat Club was held at Stamford Park Lake, on Sunday, July 14th, under favourable weather conditions.

We were pleased to welcome the very gratifying attendance of visiting competitors from affiliated M.P.B.A. clubs, some of whom had travelled considerable distances to be present; which we regard as significant of the popularity of the sport in general, and as encouragement to us, a relatively youthful club. We wish to express our thanks to the visitors from Bournville, Fleetwood and Rochdale, who helped to swell the entry, and also Mr. Vanner, of South London, who once again made a special trip to compete in our steering competition.

The programme consisted of a six lap race for 30 c.c. I.C. and flash steam engined boats not exceeding 16 lbs., a three lap race for 15 c.c. and flash steam boats not exceeding 7 lb., and a steering competition.

In the 30 c.c.-cum-flash-steam race, ten competitors turned out, but due to mechanical trouble of one sort or another, the number of boats that completed the course was rather disappointing, from both the spectators' and competitors' point of view. Furthermore, those boats which did perform consistently were not up to their usual standard of speed. The speed championship cup was eventually won by Mr. Booth (Fleetwood) at 28.33 m.p.h. with his o.h.c. engined boat "Spook." Mr. Booth's boat was the most consistent 30 c.c. present, its reliable running was admired by all, but its speed was a little disappointing, as we know that it is capable of a better performance. The second place was taken by the Barrow brothers (Altrincham) with "Spitfire," which actually finished the course minus half the front plane on its first run. In this condition, on its second run, it completely failed to get its nose up, giving an excellent display of sea-ploughing for two laps before it was stopped. The third place was taken by our captain, Mr. Tomkinson, with "Rene II," but the performance was far from that of the "Rene" we have known. We expected some fireworks when Mr. Wilson, commodore of the Fleetwood Club, arrived with Mr. Westhead's

"Frisky II," but we got water-works instead. The engine was not improved by its submarine efforts, and its subsequent performance was not up to its usual standard. Mr. Tryhorn, of Bournville, had difficulty in inducing "Koko's" engine to start, and when he did eventually get going after heroic string-pulling, he was very unfortunate in losing the top of the float-chamber, which put him out of the running for the rest of the day.

Mr. Wolfenden, of Rochdale, was present with his new boat "Jubilee," but he did not succeed in getting a run. This was unfortunate, as the boat, which is of interesting hull and engine design, has already shown exceptional speed possibilities, and we expect that more will be heard of it when it has got over its teething troubles. We understand that the joint owners of "Mayfly I" had worked through the night constructing a silencer, which proved so efficient that no one had any grounds for complaint except the two owners, whose best efforts failed to produce any noise at all. Mr. Hallam, the sole representative of flash steam, had feed-pump trouble, perhaps "Menai" was pining for its fellow flash steam boat, "Evil Spirit," whose owner, Mr. Westmoreland, was unfortunately unable to be present.

The three-lap race for smaller boats attracted two entries, Messrs. A. and G. Wilson, both of Fleetwood, the fastest time being made by Mr. A. Wilson, with "Don," the speed being 14.83 m.p.h., although both entrants have previously bettered 20 m.p.h. The club's 15 c.c. representative, Mr. Cooper, had unfortunately not completed his new hull in time for the regatta.

Although bad luck dogged the competitors in the speed events, the steering competition was a great success, and was very popular with the large crowd of enthusiastic spectators. The silver challenge cup was won by Mr. Fry's (Altrincham) scale model Admiralty pinnace (six-footer) piloted by Secretary F. Waterton in the absence of the owner. Mr. Waterton, who is more used to the circular course, made a bad miss first time, but hastily realising that this wasn't a pole event, scored two bulls in rapid succession (10 points) which apparently so demoralised "Leda III" that Mr. Vanner's official score was an outer, an inner and an outer (5 points). Mr. Vanner recovered form later, and was prepared to give us a demonstration of bull shooting for the rest of the day. There were nine boats in the straight running class; some of the prototype models are worthy of special mention, both for finish and performance, and we had a very definite lesson in the appeal which this class makes with the public, particularly when the speed events are marred by mechanical troubles.

Mr. Picknell's (Bournville) steam launch "Mayfly" and Mr. Atkinson's flash steam launch "Kleen III" are first-class jobs as pieces of marine modelling, in addition to their attractive running on the water. Mr. Davies (Altrincham) took the opportunity of launching his 1/72nd scale model "Vylsia," which is a faithful record of a war-time V class destroyer, as far as is practicable in a working model. The boat is electrically propelled, but the power plant was not quite complete, so that we did not see it running in the steering competition. Fortunately this did not matter, as Mr. Fry's pinnace had already done the job for the navy! Mr. Fry's is also a steam-driven boat, and a very fine piece of modelling in addition to its steering qualities.

QUERIES and REPLIES

Querists must comply with the Conditions and Rules given with the Query Coupon in the Advertisement Page of each issue.

6,704.—Bending Copper Tubes.—E.D. (Teddington).

Q.—I want to bend some fairly complicated shapes from 3/16 in. solid drawn copper tube about 18 in. long, and think that the best way would be to fill the tubes with lead. But if hot lead is poured into copper tube and allowed to cool slowly, I think the copper would become brittle, whereas if it is quenched out after heating to anneal it, it seems to me that violent happenings will take place as the copper suddenly contracts on the molten lead, before the latter has had a chance to contract. Can you tell me which is the lesser of the two evils?

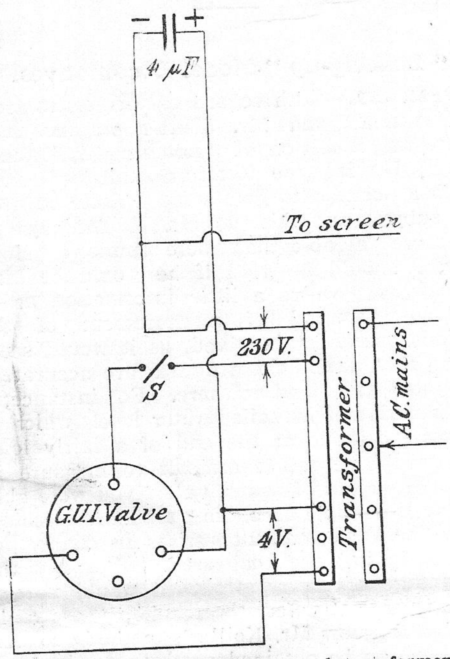
A. — We do not understand your assumption that heating copper tube by pouring into it molten lead will make it brittle if not quenched or cooled rapidly. It is heating copper that anneals it; the quenching is done as a matter of convenience. In the case of brass tube, heating in the manner described makes it brittle while hot, and then, if subjected to unequal strain during unequal cooling, it might crack, but this does not apply to copper. It is the zinc element in brass that becomes and remains rotten at high temperatures, but this again becomes normal when cold. The lesser of the two evils, therefore, is to let it cool slowly. Copper at high temperature is ductile and it should not crack even if quenched unevenly, but do not quench in this case, as if some water got into the tube, the rapid generation of steam by the molten lead might cause a serious accident in the matter of scalding, and should not be risked.

There are special bending fillings for bending tubes. One which we have before us is called "Bendalloy," which goes down at as low a temperature as 158° F. It can be easily run under water at boiling temperature. You can obtain all particulars of it from Messrs. Mining and Chemical Products, Ltd., 116, Old Broad Street, London, E.C.2.

6,690.—Connecting Rectifying Valve to Transformer.—J.H.F. (Rotherham).

Q.—Would you please give me the correct connections to make between an Osram G.U.I. rectifying valve and a small transformer.

A.—The diagram reproduced here indicates the correct connections between valve and transformer, as given by the makers of the



Connections of rectifying valve and transformer.

rectifier to suit a transformer. The maximum rectified current as a half-wave rectifier is 200 milli-amperes, with delayed switching of anode. If instantaneous switching of anode and filament, 60 milli-amperes must not be exceeded. The sketch indicates a switch at "S" for the purpose of delaying the anode voltage until about one minute after the application of the filament volts.

6,707.—Removing French Polish from Hulls.—W.H.W. (Alton).

Q.—Can you tell me if there is any liquid, similar to paint remover, with which I could remove the French polishing from a model boat hull without injuring the woodwork (teak). Failing a liquid, do you think that a soft cloth well soaked in linseed oil and brick dust would do the trick?

A.—There are one or two preparations on the market for removing French polish, and these are obtainable at most large oil and colour stores. French polish can usually be removed by softening with methylated spirits dabbed on with a cloth, the surface is then scraped with a piece of flat steel, afterwards being cleaned off with sandpaper. This method is probably as good as any other if the polish is not too hard, though care must be taken so that the actual wood is not scraped too much

One occasionally comes across articles polished with a preparation that is only dissolved by turpentine or acetone.

PRACTICAL LETTERS *from* OUR READERS

Where Does the Energy Go?

DEAR SIR,—This seems to have an ancient and fishlike smell, but owing to the usual paucity of information, anything more than a guess is impossible. That "rusting" may have been direct oxidation, a complicated reaction via the CO_2 route, or more likely, a combination of both, with varying heat liberations, a chemical analysis and micro photo, would enable a rough estimate to be given. Take a steel containing: Iron, 97.95 per cent.; manganese, 1.1 per cent.; carbon, 0.75 per cent.; sulphur and phosphorus, 0.06 per cent. each; and make a spring of such a weight as will absorb half a B.T.U. without its temperature being raised beyond say 225° C. If this spring and its half B.T.U. be "rusted" by either the wet or dry process, I think that the heat evolved in this operation will completely overshadow the original dose.

I would suggest that your Croydon correspondent obtains a nice hefty motor tyre, and a small hand pump, and instructs his student friend in their use. Draw his attention to the transformation of his manual energy into increased tension and temperature in the tyre, and show how the latter dissipates very soon. When that imprisoned wind is released, it must collect that lost heat from somewhere, before it can resume its normal volume and pressure. Now, action and re-action being equal and opposite, how does that student recover the energy he put into the pump?

Yours truly,
"OLD MILLWRIGHT."

Yorks.

Model Loco. Performances.

DEAR SIR,—The following details of performance by model locomotives on my track may be of interest. The original record of 44 seconds for the 209 yards circuit (an average speed of 9.71 m.p.h.) was made on Sunday, May 5th, by W. H. Hart, driving Mr. Gosnell's 1 in. scale L.S.W.R. Adams type 4-4-0 express No. 592.

On Saturday, June 8th, this was lowered to 43 seconds = 9.94 m.p.h, by Mr. W. H. Irwin, and shortly afterwards to 38 seconds = 11.25 m.p.h., by W. H. Hart. In both cases, No. 592 was the locomotive used.

The load hauled, excluding engine (about 95 lbs.), was: tender, 45 lbs.; truck 53 lbs.; driver, W. H. Hart, 10 st. 6 lbs. (146 lbs.). or 244 lbs. in all. In three places speed had to be checked on account of curves. Cylinders, 1½ in. × 2 in.; driving wheels, 7 in. diameter; boiler pressure, 75 lbs. per sq. inch.

A competition to see who could travel farthest on 1 lb. of coal took place on June 10th.

(1) Dr. Robinson's 1 in. Scale G.N.R., 8 ft. single, driven by Mr. John Robinson. Load, tender 45 lbs., truck 53 lbs., driver

11 st. 6 lbs.; total, 258 lbs. Travelled 25 circuits in 36 minutes, that is, 5,225 yards at 4.947 m.p.h.

(2) Same engine, with W. H. Hart driving. Load, 244 lbs.; completed 31 circuits in 35 minutes, or 6,479 yards at 6.311 m.p.h.

(3) Mr. Gosnell's 1 in. Scale L.S.W.R., No. 592, G. Beesley driving. Load, 258 lbs. Made 27 circuits in 31 minutes, or 5,643 yards at 6.205 m.p.h.

If an adjustment is made in the case of (2), for the reduced load taken—244 lbs. in place of 258—the 31 circuits being reduced to $\frac{31 \times 244}{258}$, the distance would be 6,127.42 yards, and the average speed 5.967 m.p.h. There are gradients and various curves.

Yours faithfully,
Streatham, S.W. W. BARNARD HART.

Why Taps Break.

DEAR SIR,—In the July 4th issue of the "M.E.," reference is made on page 14 to the causes of broken taps. All "W.J.S." says in regard thereto is very true.

For a rough and ready method, the drill intended to be used should *just* pass through a standard sized tapped nut. The tap wrench (and here is where the main error creeps in) should be proportionately smaller. Indeed, a watchmaker's chuck should suffice for 3/32 in. taps and under, with no more pressure than can be exerted with the finger and thumb. If the tap won't go with this, then the hole is on the small side.

For ⅛ in. and over, a leverage of 1½ in. is ample. In this way, one gets *warning,* and in course of time the feel of the cut is acquired, and many hard words saved!

The *skin* of the metal, particularly with cast iron, is sometimes harder than the tap itself, with the result that in reaching the end of the hole (a through hole), the cutting edges of the tap is called upon to meet its own match, *and ceases to cut,* when, if one does not accept the danger signal, *bang goes the tap*! Then follows the rending of garments and crying out in a loud voice.

Taps should be of the *best* make, it pays in the end. A cheap tap or "discard" may have warped in the tempering, hence one may have a bent tap. Start to tap a fairly deep hole with one of these *bent* taps, and what is going to happen when the tap tries to follow the *straight* hole is a foregone conclusion.

For my own part, I use only the very best procurable in everything pertaining to screwing tackle, and at that I may break a tap if I get too *fresh.*

"W.J.S." did a good thing for the average amateur when he touched on this subject, remembering that some perhaps become dejected over breaking a tap and spoiling a piece of otherwise finished work to the extent that they may quit model making altogether.

In this direction, amateurs should take heart in the thought that, after all, the *big practice* they are emulating has its mishaps, too. The *shop goes on just the same.* The belts and wheels still keep whirling, whilst the oldest hand will coolly remark, "It's al' i' th' day's wark."

Yours faithfully,
Lakewood, Ohio. P. W. WILSON.

"Linking-up" Model Locomotives.

DEAR SIR,—With regard to the letters from Mr. Rendall and Mr. Keiller on the most interesting question of "notching up" small locos., I think the Romford Club will soon be in a position to give some definite data on the subject and this, as Mr. Keiller says, is far more valuable than mere opinions. However, I should be glad if he would be kind enough to give us a little information as to the best method of measurement of the various quantities involved, as it would seem to me that unless these figures are accurately computed, they lead nowhere. For instance, a slight variation in boiler water level, which is almost inevitable at the end of a fairly long run, would be rather difficult to measure in terms of weight of water, unless you were able to put the whole loco. and tender on scales, while the same difficulty arises in connection with weighing the coal used. Possibly the percentage of error introduced would not be large enough to affect the results, but I would be glad to know Mr. Keiller's methods, so that our data can be obtained on the same basis of accuracy.

So far, we have concentrated on obtaining the maximum non-stop runs and high speeds! But we are anxious to put our track to more useful purposes, and no doubt it will be possible to furnish some interesting information in the near future. I cannot understand why Mr. Keiller's 2-8-0 used as much water when linked up as in full gear. This means that the same *amount* of steam went into the cylinders in each case, and at first sight it would appear that the valve gear is not fulfilling its proper functions! Knowing the standard of efficiency which Mr. Keiller maintains, this seems improbable, but can it be that the amount of steam which he gets into the cylinders when in full gear is not so large as it might be? A little restriction somewhere perhaps? (—dare we whisper it—in the ports?). Otherwise it is apparent that the benefits obtained from expansive working require higher steam pressures than he was using in the cylinders. I take it that he had to use more throttle to maintain the 4 m.p.h. when linked up? My experience has been that it is of no use to start linking until the conditions of load and speed require nearly full throttle, or in other words, a steam chest pressure approaching boiler pressure, but that the effect of linking is most pronounced, giving, at the *right setting* of the lever, a marked "liveliness" to the loco. which is difficult to define, but most apparent to anyone who is able to gauge a loco.'s response to any driving adjustments. In addition,

although so far no measurements have been taken, all our "drivers" can confirm that the water level is maintained with a larger degree of by-pass than in full gear. Two of our locos. have Baker gear, and the opinion of their owners is that the correct setting for any given conditions is so critical, that the wheel and screw is to be preferred to the levers and notches at present fitted.

Looking at the problem from another angle, we can say that Mr. Keiller's loco. in its two runs did the same work with the same expenditure of heat and the same evaporation in each case. In other words, it seems as though his fire burnt no more fiercely under the full gear blast than under the considerably reduced blast resulting from linking up. This hardly seems right, as surely the property of automatic adjustment of the rate of combustion to the demands of the cylinders by the variation of the blast is one of the most useful the loco. possesses? If the steam chest pressure was so reduced by means of the throttle when in full gear that the resultant blast was of the same intensity as when linked up with a higher steam chest pressure, then I would say that the conditions of load and speed were not such as to derive any benefit from expansive working, and when making tests on our track, I think we will put a fair load behind the engines and try to obtain rather higher speeds than 4 m.p.h if possible. By a fair load I mean at least three passengers, although I know there are some who consider this decidedly unfair on the engine!

It is a pity Bexhill is such a long way from Romford, as I would very much like to see one of Mr. Keiller's locos. on our track, and I'm sure he will be surprised at the splendid results obtained by some of our members with loco.'s built to "Live Steam" specifications.

Yours truly,
S. W. CARR
(Romford and District Model Engineering Club).

Romford.

Steam Cars.

DEAR SIR,—I read "Smoke Rings" in your issue of 8th August with considerable interest, particularly because you described a ride in a "Doble" steam car.

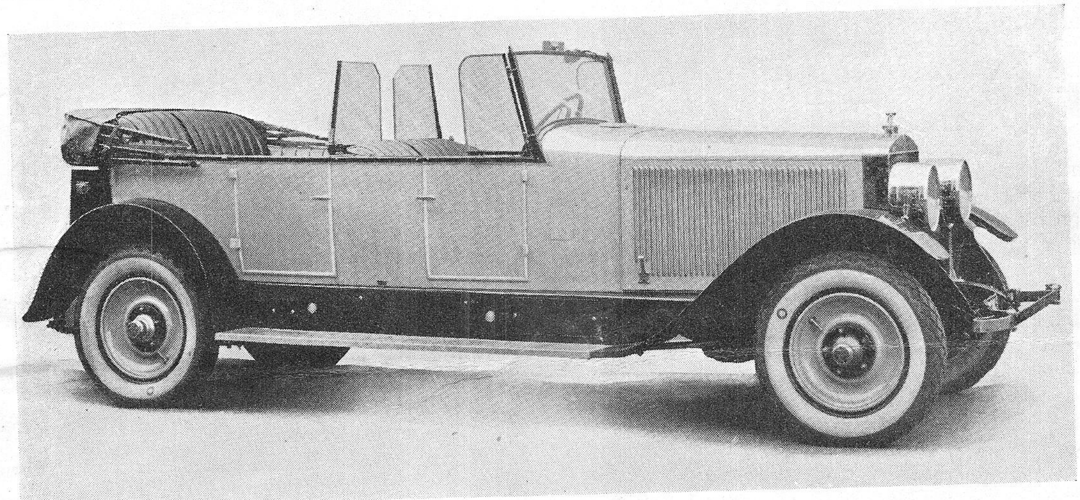
Since this was printed I have received the comments of several friends who have expressed surprise that your paragraph does not state that the car with which Mr. Bowley has been experimenting is a Doble steam car, although the only items of description together constitute a description only of the Doble car. I take pleasure in enclosing a photo from my record album showing this car described by you as it appeared before boxing for delivery to its purchaser in England.

The model E Doble steam car, of which this car was number 10, was designed by me in 1922 and placed on the market in 1924. The entire chassis and all of its components, with the exception only of tyres, instruments and like equipment, were designed and manufactured in our own shop. Car E-10 was imported into England in the Autumn of 1924 by a London motor firm. It was subsequently acquired by a Mr. Bentley, at that time of John Musgrave and Sons, of Bolton. I last saw this car in York, where Mr. Bentley went after John Musgrave and Sons collapsed, on 4th March, 1933, at which time I took a photograph of the car and noted in my diary that "Last registration expired on 31st December, 1928, with 12,919 miles on the speedometer."

I am happy to note that this old car is being found useful for the experimenting of Mr. Bowley, for it was not an inspiring sight as I last saw it. There are five other Doble cars of this same vintage in various parts of the world, being used for the purpose of experimenting, and it is a source of pride to me that the experimenters have found that the construction of the model E Doble car is worthy to serve as a basis for such interesting and perhaps useful endeavours.

Very truly yours,
Shrewsbury. ABNER DOBLE.

[We refer to this letter in "Smoke Rings"—ED., "M.E."]



The Model E Doble Steam Car referred to in "Smoke Rings" August 8th issue.

Institutions and Societies.

The Society of Model and Experimental Engineers.

Meetings at Caxton Hall, Westminster, at 7.0 p.m.: Tuesday, September 17th. Lecture by Col. A. F. Marchment on the "Testing and Rectification of Machine Tools." Wednesday, October 9th. Competition, Track and Model Night.

Workshop. A Rummage Sale will be held on Monday, September 2nd. A number of items from the workshop of the late Mr. F. W. Pringle will be offered for sale, and there are also other very interesting and useful lots. It is hoped that there will be a good attendance.

Full particulars of the Society, forms of application for membership and tickets of admission to one of the Society's meetings and/or to the workshop may be obtained from the Secretary, R. W. WRIGHT, 202, Lavender Hill, Enfield, Middlesex.

The Aylesbury Gang.

The next meeting will be held at the First and Last Hotel, Dunstable, on Friday, September 6th, at 7.30 p.m., when a demonstration on the use of hand scrapers will be given by a member who is an expert in the art. Any readers who may wish to attend will be welcome.

H. D. BOND, Park Square, Luton.

Norwich and District Society of Model Engineers.

The annual general meeting for the appointment of officers and presentation of accounts will be held at the Willis Memorial Workshop, King Street, Norwich, on Thursday, September 5th, 1935, at 6.30 p.m.

The Society's annual exhibition has been fixed for Thursday, Friday and Saturday, October 3rd, 4th, and 5th next. A special prize of £3 3s. is offered for the best model or piece of work entered for open competition by a member of any model engineering society. Entry forms may be obtained from the Hon. Secretary, W. F. A. WAY, 73, Gipsy Lane, Norwich.

The Altrincham Model Power Boat Club.

A Club meeting will be held in the Scouts' Headquarters, Stretford, on September 9th, at 8 p.m., to discuss the final arrangements for the September regatta, which is to be held at Stamford Park Lake on Saturday, September 21st, commencing at 2.30 p.m.

The events will be: (a) A 500 yds. Circular Course Race for 30 c.c. I.C. engined and flash steam hydroplanes, and (b) a Steering Competition. We extend a hearty welcome to all members of affiliated clubs.

Hon. Sec., F. W. WATERTON, 3, Grosvenor Square, Ashton-on-Mersey.

The Manchester Model Railway Society.

For the winter programme of the above Society, a number of interesting lantern lectures have been arranged, together with a Pathescope film of the visits to the various locomotive depots during the summer season, taken by Mr. E. Bird, a member. There is also a possibility of two 16 mm. film evenings, by arrangement with the L.M.S. Railway Company. So if there are any "lone hands" in the district, will they please come along and give the Society a chance to show them the advantages of Club work? We are sure they will not be disappointed.

Fixtures for September are: Thursday, 12th, at 7.30 p.m., Lantern Lecture by Mr. G. H. Platt: "The Railway Museum, York." Tuesday, 24th, at 7.30 p.m., Ordinary Meeting at Headquarters.

Hon. Secretary, ARTHUR PEAKE, 8, Methuen Street, Longsight, Manchester.

Malden Society of Model and Experimental Engineers.

Thanks to the kindness of the Malden Horticultural Society, the Club held their first public Exhibition at the Flower Show on Saturday, July 27th.

The Marine section comprised several fine warships and speed-boats.

The General and Railway section consisted of two engines, and the working model signal cabin and station by Mr. Pearce.

We should like to take this opportunity of thanking the members who so kindly loaned their models. We would welcome any model engineers in the district who care to pay the Club a visit, any Friday evening, at the new headquarters and workshop at Blagdon Lane, New Malden.

Hon. Secretary, J. A. BISHOP, 100, Cambridge Road, New Malden, Surrey.

Notices.

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. Matter intended for publication should be clearly written on one side of the paper only, and should invariably bear the sender's name and address. Unless remuneration is specially asked for, it will be assumed that the contribution is offered in the general interest. All MSS. should be accompanied by a stamped envelope addressed for return in the event of rejection. Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All subscriptions and correspondence relating to sales of the paper and books to be addressed to Percival Marshall and Co., Ltd., 13-16, Fisher Street, London, W.C.1. Annual Subscription, £1 1s. 8d., post free, to all parts of the world. Half-yearly bound volumes, 11s. 9d., post free.

All correspondence relating to Advertisements and deposits to be addressed to THE ADVERTISEMENT MANAGER, "The Model Engineer," 13-16, Fisher Street, W.C.1.

Contents.

The asterisk (*) denotes that the subject is illustrated.

SALES AND WANTS

EVERYBODY'S MARKET for ENGINEERING & SCIENTIFIC ELECTRICAL GOODS

Advertisements are inserted in these columns at the rate of **One Penny** *per word; minimum charge for advertisement,* **One Shilling.** *Single letters or figures are charged as words, and a compound word as two words. The advertiser's name and address are charged for.*

Advertisers who wish to separate *their announcements into distinct paragraphs must have not less than 20 words in any one paragraph followed by the word "Below"—which is charged for.*

"Box" replies, *care of these offices, are charged 6d. extra to cover postages. The following words must appear at end of advertisement: "Box——, 'Model Engineer' Offices," for which usual rate will be charged. (Advertisers need not include our full address.)* **When replying to a "Box No." advt.** *address your envelope: Advertiser, Box——, "The Model Engineer," 13-16, Fisher Street, London, W.C.1.*

All advertisements in these columns must be prepaid, *and remittances should be made by Postal Orders or Stamps, and sent to the Advertisement Manager, "The Model Engineer," 13-16, Fisher Street, London, W.C.1.*

Please state under which Classified Heading you wish your advertisement to appear; the classifications are as follows:—

General, Models, Wireless, Motoring, Tools, Engines, Electrical, Business, Wanted.

Advertisers are requested to send in their announcements as early in the week as possible, as although we accept advertisements up till the first post on Friday preceding the date of issue, **we cannot guarantee the insertion of those arriving on this day.** *Telephone: Holb.: 3818-3819.*

OUR DEPOSIT SYSTEM.

We will receive from intending purchasers the purchase money of any article advertised or sold by our advertisers, and will acknowledge its receipt to both the Depositor and the Vendor, whose full names and addresses must be given. Unless otherwise arranged beforehand between the parties, it is understood that all goods are sent on approval, and that each person pays carriage one way if the goods are returned. The deposit is retained by us until we are advised of the completion of the purchase, or of the articles having been returned and accepted. In addition to the amount of the deposit, a fee of 1/- for the sum of £1 and under, and 1/6 for amounts in excess of £1, to cover postage, etc., must be remitted at the same time, and sent to the Advertisement Manager, "The Model Engineer," 13-16, Fisher Street, London, W.C.1. In cases of persons not resident within the United Kingdom, double fees are charged.

The amount of the deposit must be sent either by Postal Order or Registered Letter. **(Cheques cannot be accepted.)**

The fee mentioned above should be sent in stamps or by Postal Order as a separate amount.

In cases of exchange, money to the value of the article should be deposited by each party. **We cannot receive the articles themselves.**

General

Watch Repairers. Send 3d. for list of Tools, Materials, Watches, Clocks, Gramophone Parts. Guaranteed watch repairs. Complete clock movements stocked. Parcels fully insured.—BLAKISTON, Ainsdale, Lancs.

Morse. Morse. You hear it often on your loud speaker. Why not know what it means? "Morse Alphabet Memorised in Five Minutes," price 7d. post free. — PERCIVAL MARSHALL & Co., LTD., 13/16, Fisher Street, London, W.C.1.

Cheap Printing. 1,000 Billheads, 3s. 6d. Samples free.—CRETEWAY PRESS (22), Buxted, Sussex.

"Eureka" Improved Air Compressors for paint spraying, inflating Tyres, etc., pressures up to 120 lbs. sq. in.; No. 2 model, 55s.; No. 3 model, 50s.; Drawings and castings, No. 2, 10s. 6d.; No. 3, 12s. 6d.; photo, 3d.—POYSER, Peck's Hill, Mansfield.

"Power Driven Model Aircraft," by F. J. Camm, 1s., post free 1s. 2d. With special chapters on making petrol, compressed air and steam engines, wheels, carburettors, ignition systems, and power-driven model aeroplanes.—PERCIVAL MARSHALL & Co., LTD., 13-16, Fisher Street, London, W.C.1.

Pocket Books. Practical Electrician's Pocket Books, 2s. 10d. post free; Fowler's Mechanical Engineer's Pocket Book, 3s. 4d. post free; Fowler's Electrical Engineer's Pocket Book, 3s. 4d. post free; Mechanical World Pocket Book, 1s. 10d. post free; Practical Engineer's Electrical Pocket Book, 2s. 10d. post free; Practical Engineer's Mechanical Pocket Book, 2s. 10d. post free; Mechanical World Electrical Year Book, 1935, 1s. 6d., 1s. 10d. post free.—PERCIVAL MARSHALL & Co., LTD., 13/16, Fisher Street, London, W.C.1.

Case-Hardening and Heat Treatment. Send your inquiries to. — KASENIT, LTD., the recognised specialists, Henry Street, Bermondsey, S.E.1.

Engrave on Metals with the Vibrita Engraving Machine, tallies, name plates, etc., speedily done. A.C. mains only. £3 complete. Particulars.—LYCETTS', Skinnergate, Darlington.

Small Turned Screws, Nuts and Washers. Assorted gross B.A., brass 2s., steel 2s. 6d. Whitworth, brass, 3s., steel, 2s. 6d. List and samples, 2d. Trade supplied.—J. H. BENNETT, Station Road, Willesden Junction, N.W.10.

Safety First! An "Ajax" Safe might save that book or deed from being stolen or burnt. List application.—GREENWOOD, Arnside Road, Southport.

Smokers! Fun! Cigarettes? Introduce my simple geometrical conundrum to friends. P.O. 6d. Stamped addressed envelope.—MODLEER, 174, Sixth Avenue, Manor Park, London, E.

Screws, Nuts, Washers (Special Model Engineers' Sizes). Everything for Electrical Rewinds and Repairs. Lists free.—LUMEN ELECTRIC COMPANY, Scarisbrick Avenue, Litherland, Liverpool, 21.

Bargains' Air Compressors, new, 30s.; Super Spray Guns, 18s. 9d. — JOHN M. E. STEEL, Bingley.

New Skefto Ball Bearings, 1½", 11/16" bore, 2s. 6d. per pair.—C.P., Engineer, 1, Western Road, Tunbridge Wells.

Ball Bearing Plummer Blocks, 1", 5s.; ¾", 4s. 3d.; ½", 2s. 6d. Shafting, Hangers, Pulleys, Cones, Complete Countershafts from 10s.—HALL'S, 30, Collindale, Erith.

Express World Delivery Service. "Possibilities Small Lathes," "Turning," "Simple Decorative Lathe Work," Lukin, 2s. each posted, C.O.D. United Kingdom, 6s. 4d. set (selling like penny cakes); "Ornamental Turning," Evans (3 vols.), 6s., C.O.D., 6s. 4d.; "Illustrated by examples of great beauty."—Leisure Hour. Both sets C.O.D., 12s. 6d. —ALBERT FEATHER, Bookseller, 93, White Abbey Road, Bradford, Yorkshire, England.

Home Cinematography

Movies at Home. How to make your own Cinema Projector. Particulars free.—MOVIESCOPE (O), Pear Tree Green, Doddinghurst, Essex.

Models

"Pioneer" Castings and Parts, machined or rough. Stamped envelope for list.—FENN, 2a, Charles Place, Drummond Street, London, N.W.1.

Boilers in Steel or Copper, all types and sizes. Locomotive Boilers from ½" scale made to fit your frames, flanged plates, supplied copper or steel. — GOODHAND, Marlborough Road, Gillingham, Kent.

Model Competition for Amateurs at Hospital Gala. Prizes £1 and 10s. Entry forms from: OAKES, "Maybrook," Gildersome, near Leeds.

Powerful 2½" Gauge Atlantic, engineer built, brazed, coal-fired boiler, new condition, cheap. —45, Elms Lane, Sudbury, Wembley.

Hor. Engine, Vertical Boiler, magnif. job, quarter horse, weighs 150 pounds, exhibition job, £35; also Boiler for six foot boat, 30s.; Small Steam Donkey Pump, 30s.; Launch Engine, inch bore, reversing, 150s.; Arkell finish to all these bargains; seen by appointment. — ARKELL, 6, Normandy Avenue, Barnet, Herts.

Bond's 30 c.c. O.H.V. Engine, float carb., full ignition equipment, petrol tank, exhaust pipe and silencer in copper, ball bearing screw shaft with screw, suit hydroplane, cost £12 10s., £7 10s. or offer.—PENN, 101, Pages Walk, London, S.E.1.

Beautiful Sailing Model Ocean Yacht, built by naval officer, length 63½ inches O.A., cost £20, complete with packing case. Bargain £5. Photos. — Box 858, MODEL ENGINEER Offices.

For Immediate Sale. A 1¾" Gauge Model Railway, comprising Two Coal Fired Locos. built by Bond's, Large Assortment of Rolling Stock, also Tracks, Station, etc., all in perfect condition. Reply by Air Mail to R. A. SIMPSON, 12, Forbes Street, Fellside, Johannesburg. Issue of MODEL ENGINEER of 14/2/35 contains pictures of portion of models offered.

Complete Garden Railway, 1½" Scale Loco., 7¼" gauge, 450 feet Track, Station 12 feet × 9 feet, Signal Box 4' × 2' 6", 3 Signal Posts, Complete 20 Gallon Water Tank, Ticket Dating Machine, etc., 3 Carriages, One Goods Wagon. Price £150; seen by appointment. — FOSTER, Moorton Lodge, Levenshulme.

Castings and Drawings for 3½ Gauge L.M.S. "Princess Royal" and "Eton," S.R. "Schools" class. All loco. parts to order. Flanged plates, boilers. Stamp.—H. P. JACKSON, 90, Holgate Road, York.

Bassett-Lowke H.C.F. Boiler, 35s.; Grayspec 15 c.c. Engine, 50s.; 12v. 11 amp. Dynamo, 25s. Wanted "Folboat." — 36, Canadian Avenue, Catford.

"Express" Loco' Supplies Co. "Maisie" Cylinder Castings, 10s. 6d., all steel for coupling; Connecting Rods and Cross-heads, 2s. 6d.; Driving Wheels, 1s. 3d. each; Trailing, 8d.; Bogie, 6d. Blue Prints, No. 1, 3s. 6d.—52, Blanmerle Road, New Eltham.

Clockwork "O" Gauge Loco., £1; Hornby Breakdown Van and Crane, 3s.; Senior Petrol Engine, 1" × 1" Castings, 10s.—BLAKE, 31, Idmiston Road, Worcester Park, Surrey.

"Models" (*continued*)

Stuart Mill Engine for Sale, 10s., perfect. —HARMER, 15, Cardigan Road, Hull.

30 c.c. Grayson O.H.V. Engine, coil and contacts, few details want finishing, £3; Set Westbury 15 c.c. O.H.V. Castings and Drawings, crankcase part finished, 7s. 6d.—H. L. SHARVELL, 68, High Road, Wembley.

Liquidator's Stock. Number of Small Power Horizontal Steam Engines, with boilers, boiler fittings, and belt driven dynamo lighting sets, 30s. each, carriage paid. Stamp particulars.—ESPREY, The Springs, Brereton, Staffs.

"Model Engineering." By Henry Greenly, A.I.L.E. With working drawings of Engines, Boilers, Rolling Stock, Cannon, Electric Machines, etc., 85 photographs and 724 line drawings. Price 9s. 3d., post free.—PERCIVAL MARSHALL & Co., LTD., 13-16, Fisher Street, London, W.C.1.

Tools

Wade Lathe Screwcutting Attachment, 15s., post 1s. 3d. extra.—AIRD, Gardner Street, Brighton.

Eureka High Speed Ballbearing Drilling Machine. Castings and drawings from 12s. 6d. Also Rotary Milling Tables and Filing Machines. Particulars and photo, 3d. each.—POYSER, Peck's Hill, Mansfield.

Burnerd Chucks, British Made, for accuracy and lasting service. Small independent 4-jaw with steel bodies, and reversible jaws, minimum weight and overhang, ideal for model, instrument, and precision work, $3\frac{1}{2}''$, 20s.; 4", 21s.; $4\frac{1}{2}''$, 25s.—Below.

6 in. Independent Model with semi-steel body, suits Drummond $3\frac{1}{2}''$ and 4", and larger lathes, 50s.—Below.

3 in. 3-Jaw Lever Scroll Model with 2 sets jaws, 27s. 6d. Small overhang, light weight. Descriptive lists, with backplate prices, on request. All postages extra. Obtainable from all tool dealers; or from: F. BURNERD & Co., Dryburgh Works, Dryburgh Road, London, S.W.15.

Lathes, Power and Treadle, by all the leading makers, in stock. Send your inquiries.—ROSS & ALEXANDER (LONDON), LTD., 165, Bishopsgate, E.C.2.

Milling Attachments, Dividing Heads, Circular Table. — WHEELER Co., LTD., Trench, Wellington, Shropshire.

Lathes, Britannia, C.A.V., Drummond, Edgar, Eta, Exe, Milnes, Portass, Wade and all leading makes in stock.—BUCK & RYAN, 310-312, Euston Road, London.

Enjoy Your Leisure. Make work a pleasure with a "Myford" 3" Lathe. Wonderful value. Moderate price. Designed for efficiency and utility. Write for illustrated list, including full range of accessories for this machine. — MYFORD ENGINEERING Co., Neville Works, Beeston, Notts.

Below Cost! 25 Parcels New English High Speed Straight Shank Twist Drills, 15/32 to 1". List price, £11; clearance price, 25s. parcel.—GREENWOOD, Arnside Road, Southport.

About $\frac{1}{4}$ Cost Price! 25 Cases "Leonard's" Cylindrical Plug Gauges $\frac{1}{4}''$ to $1\frac{1}{4}''$ (15 sizes), 30s. case. — GREENWOOD, Arnside Road, Southport.

Under Cost! Highest Grade Lathe Tools, 12 per set, high speed, 7/16", 17s.; $\frac{1}{2}''$, 18s. 6d.; 9/16", "Speedicut," 21s.; also sets up to 1". Prices on application.—GREENWOOD, Arnside Road, Southport.

Complete Portable Workshop Layout from £20 upwards; see advert. June 27, '35; large photo, 1s. — BLACKSHAW, Sunderland Street, Macclesfield.

Full Set of Watchmaker's Tools and Materials, 30s. the lot. — SHERLIKER, 17, Balfour Road, Preston.

Cushman Type $3\frac{1}{2}$ inch S.C. Chuck, two sets jaws, Backplate Casting, new, 20s.—CORBETT, 10, Evans Street, Willenhall, Staffs.

Lathes for Sale, for Pleasure or Profit, backgeared or screwcutting, treadle or power, from $3\frac{1}{2}''$ to 6" centres; Plain lathe from 50s. Also parts cheap. — FORD, 174, Vicarage Road, Leyton, E.10.

Our Popular 1s. 9d. Bargain Parcels, any four lots, 6s.; Lot 2, One Dozen High Speed Number Drills, sizes 12 to 48; Lot 3, 12 Doz. Bright Steel Washers, $\frac{1}{8}''$ to $\frac{3}{8}''$; Lot 4, 12 Doz. Whit. Screws, $\frac{1}{8}''$ to $\frac{1}{4}''$; Lot 5, One Each $\frac{5}{8}''$ and $\frac{3}{4}''$ Whit. Taper Taps; Lot 7, One Doz. Small Files, 4" to 6".—Below.

150 Sets B.S.F. Taper Taps, guaranteed perfect and brand new of very best quality; Sizes, $\frac{1}{4}''$, $\frac{3}{8}''$, 7/16", $\frac{1}{2}''$, 9/16", $\frac{5}{8}''$, $\frac{3}{4}''$, actually worth 9s. set, clearing at 3s. 6d. set; also $\frac{7}{8}''$ and 1", 1s. each; a very good bargain.—Below.

4,000 Bundles Best Blue Twill Emery Cloth Strips, various grades, $\frac{1}{2}''$ to 2" wide, weight of each bundle, 1lb., clear, cheap, two bundles 1s. 6d.—Below.

500 No. 1 Morse Taper Shank End Mills, 11/16" diam., short pattern, right-hand, suitable for lathe, 1s. each.—Below.

40 Gross Superior High Speed Twist Drills, clear for cash, actually worth 4d. to 1s. each, size 1/16" to $\frac{3}{8}''$, a real gift, 21s. per gross; 12s. half gross.—Below.

250 Bundles Bright Drawn Mild Steel, approx. 5' length each piece, sizes $\frac{1}{8}''$, 5/32", 3/16", 7/32", $\frac{1}{4}''$, 9/32", 5/16", $\frac{3}{8}''$, 7/16", $\frac{1}{2}''$ round, 5s. 6d. per bundle of 50'; also Square Bright Steel, sizes $\frac{1}{8}''$, 3/16", $\frac{1}{4}''$, 5/16", $\frac{3}{8}''$, 7/16", $\frac{1}{2}''$, 5' lengths, 6s. bundle.—Below.

500 High Speed Tap Fluting Cutters, cuts taps $\frac{1}{8}''$ to $\frac{3}{8}''$ dia. of cutters, $1\frac{1}{4}''$, $\frac{5}{8}''$ hole, 1s. 3d. each, three assorted, 3s. 3d., worth 6s. each; also larger Cutters, $2\frac{1}{4}''$ dia., $\frac{3}{4}''$ hole, cut taps $\frac{1}{2}''$ to 1", 1s. 9d. each; three assorted, 4s. 6d.—Below.

250 Sets Feeler Gauges, 10 blades, long taper, $1\frac{1}{2}$ to 25 thous., a very useful bargain, 1s. 9d. each.—Below.

300 Drill Chucks, takes to $\frac{1}{2}''$, three jaws, No. 1 Morse taper shank or $\frac{1}{2}''$ straight shank, 2s. 9d. each.—Below.

140 Vee Blocks and Clamps, machined all over, very useful to model makers and machinists, 2s. 9d. each; 5s. pair.—Below.

24 Only, 1" Micrometers, lock-nut and ratchet stop, usual retail price 27s. 6d., all complete in plush lined case and guaranteed accurate, secure one now, 16s. 6d. each.—Below.

500 Gross Tungsten Steel Hacksaw Blades, 8", 9", 10", 12", 1s. 3d. per doz.; 12s. per gross; also Machine Blades, 12" × 1", 2s. doz.; 20s. gross; 14" × 1", 3s. doz.—Below.

1,000 Sets Hexagon Die-Nuts, C.E.I. Cycle Thread, 3/16", $\frac{1}{4}''$, 5/16", $\frac{3}{8}''$, usual price 5s. 9d. set, clear at 2s. 3d. set.—Below.

1,200 Best Quality Straight Shank End Mills, standard sizes, $\frac{1}{4}''$, 1s. 3d.; 5/16", 1s. 4d.; $\frac{3}{8}''$, 1s. 6d.; 7/16", 1s. 9d.; $\frac{1}{2}''$, 2s. each. All right-hand, suitable for use in lathe.—Below.

200 Gas Thread Taps, $\frac{3}{4}''$, 1s. 6d.; 1", 2s.; $1\frac{1}{4}''$, 2s.; $1\frac{1}{2}''$, 2s. 9d.; $1\frac{3}{4}''$, 3s. 6d.; 2", 4s.; $2\frac{1}{4}''$, 4s. 6d.; $2\frac{1}{2}''$, 6s.; $2\frac{3}{4}''$, 7s. 6d.; $3\frac{1}{4}''$, 8s. 6d.; 4", 10s. each. Taper, second or plugs. All best American or British make.—Below.

5,000 Small Slitting Saws, $\frac{3}{4}''$ dia., 1/32" thick, clear at 2s. per doz.—Below.

2,000 Slitting Saws, $2\frac{1}{4}''$ diam., $\frac{5}{8}''$ hole, also $2\frac{3}{4}''$ diam., 1" hole, 1/64" to $\frac{1}{8}''$ thick, six assorted, 3s. 6d.—Below.

1,300 Sets Hexagon Die-Nuts, Sheffield made, Whitworth, B.S.F., also American thread, U.S.S. and S.A.E., suitable for Ford and other American cars, $\frac{1}{4}''$, 5/16", $\frac{3}{8}''$, 7/16", $\frac{1}{2}''$, worth 7s. set, our clearing price, 2s. 9d. set; all the above four sets, 10s. lot.—Below.

3 Tons Best Sheffield Files, Flats Half Rounds, Square, Rounds, in rough and second cut, sizes 6", 8", 10", 12", this is a very special bargain offer, wonderful value, three dozen assorted, 10s.; also large files, 14", 16", 18", dozen assorted, 8s. 6d. carriage forward.—Below.

60 Only, Genuine Norton Grinding Wheels, suitable for general shop use, 9" dia., 1" wide, 1" hole, 4s. 9d. each, also few $1\frac{1}{4}''$ wide, 5s. 9d. each.—Below.

1,000 Fine Emery Wheels, 2" to 4" dia., $\frac{5}{8}''$ hole, $\frac{1}{8}''$ to $\frac{1}{2}''$ thick, slightly used, but quite serviceable, 1s. 6d. per doz.—Below.

5,000 Genuine Norton Grinding Wheels, $2\frac{1}{2}''$ dia., $\frac{3}{8}''$ to $\frac{3}{4}''$ wide, $\frac{3}{8}''$ hole, three assorted, 1s.; dozen assorted, 3s.; six dozen, 15s.; gross, 25s.—Below.

10s. Orders Carriage Paid except where stated otherwise, steel bars and files carriage extra.—J. BURKE, 30, Trippet Lane, Sheffield.

For Sale, Alligator Hand Planer, almost as new, can be seen by appointment, price £4.—H. E. WALKER, Ocklye Lodge, Crowborough, Sussex.

Patrick 2" Lathe Slide Rest, Foot Motor, 25s. — TUGWELL, 8, Linden Road, Redland, Bristol.

$4\frac{1}{2}$ Relmac Screwcutting Lathe, £7; Lathe, £3 10s. S.A.E., appointment.—APPLETON, 12, High Road, Leyton, E.15.

Vert. Bench Miller (Muir), gear drive, table 14" × 7", fine condition, 45s., snip. Larger machine installed.—Below.

Lathe, $4\frac{3}{4}''$, on Iron Stand, with heavy 5-speed flywheel, compound rest, faceplate, drill chuck, 3 ft. 6 in. bed, 30s.; Small Power Bandsaw (metal), 20s. — 46, Wandle Bank, Wimbledon, S.W.19.

12" Vernier Caliper Slide Gauge by Brown and Sharpe, U.S.A., spots to set trammel to one thousandth, useful for draughtsmen, polished wood case. Cost £8, take £3 5s. Guaranteed accurate.—85, Ashworth Mans., Maida Vale Tube Station London.

"Wilson" 30" Bandsaw, perfect condition, £14; "Blaisdell" $6\frac{1}{2}''$ × 6 ft. S.C. Lathe, double vee bed, £14 10s.; Machine Vice, 6" jaw opening 8", 32s.; "New Way" 4 H.P. Vertical Petrol-Paraffin Engine, bargain, £6 15s.; Virtually New 7" Backgeared Lathe Headstock, 4-speed, 43s. — MIDDLETON, 1257, Pershore Road, Stirchley, Birmingham.

Back Gear for Drummond 4" Round Bed Lathe.—36, Devonshire Road, Hackney.

Engines

Boiler, vertical centre flue, steel, coal $11\frac{1}{2}$ inches diameter, 24 inches height, fittings, £4, scarcely used. London.—Box 854, MODEL ENGINEER Offices.

Villiers Engines. "Mar-vil" Aircooled .6 h.p., Villiers Watercooled $1\frac{1}{2}$ h.p. and $2\frac{1}{2}$ h.p. Also Petrol-electric Lighting Plants from 250 volts. Unused samples at substantial reductions. View at Pemberton.—WILLIAMS, LTD., 17, Victoria Street, S.W.1.

Electrical

12" G.E.C. Fans, 220 volts, A.C.—Below.

Petrol Electric Lighting Plants, 150, 500, and 1,500 watts.—Below.

Repulsion Induction A.C. Motors, all sizes to 20 h.p.—Below.

A.C. Motors, single phase and 3-phase, various sizes.—Below.

D.C. Motors, all sizes in stock.—Below.

Charging Dynamos, various voltages and amperages.—Below.

Motor Generators, A.C. to D.C.—Below.

Rotary Convertors, D.C. to A.C.—Below.

All Goods Offered Above are guaranteed in first-class condition and at competitive prices. —COLE, Milo Works, Milo Road, Lordship Lane, S.E.22. (Forest Hill 4422.)

"Electrical Trading" Technical Book Dept., 85, Long Acre, London, W.C.2, supplies books on all electrical subjects. Write for list.

Electric Motors and Dynamos, all sizes, reconditioned guaranteed machines. — THE BRITANNIA MANUFACTURING Co., LTD., 22-26, Britannia Street, City Road, N.1.

Electric Motors, secondhand, guaranteed, all sizes, low prices. — GEECO, LTD., 47, Pitt Street, Glasgow.

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OF FORTHCOMING EVENTS.

September 1st—T.M.A.C. Power Contests (To be held at Fairey's Aerodrome, at the kind invitation of the Hayes and District Model Aircraft Club).

September 1st—Lancashire Model Aircraft Society. Lancastria Cup Competition (Speed). Ground to be announced later.

September 3rd — Finchley Model Engineers' Society. Track Night.

September 8th—T.M.A.C. Seaplane Contest, R.O.W., Danson Park.

September 8th—S.M.A.E. Lady Shelley Cup (Seaplane), at 3.0 p.m., at Danson Park, Bexley Heath.

September 8th—Lancashire Model Aircraft Society. Condor Cup Competition (Seaplanes, Flying Boats, etc.), Lindow Common. Time 11.0 a.m.

September 12th—Manchester M. R. Society Lantern Lecture by Mr. G. H. Platt: "The Railway Museum, York."

September 17th — Finchley Model Engineers' Society. Special Meeting.

September 17th — Society of Model and Experimental Engineers. Lecture by Col. Marchment on "The Testing and Rectification of Machine Tools."

September 19th-28th—Model Engineer Exhibition, The Royal Horticultural Hall, S.W.1, 11 a.m. to 9.30 p.m. daily.

September 29th—S.M.A.E. Flight Cup (Speed) (Ground to be announced later), Farrow Shield Inter-Club Contest.

October 31st—S.M.A.E. Closing date for Farrow Shield Contest attempts.

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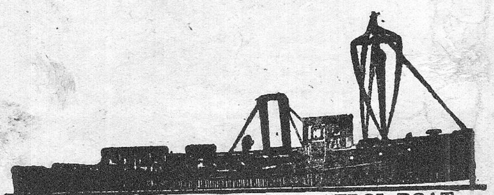

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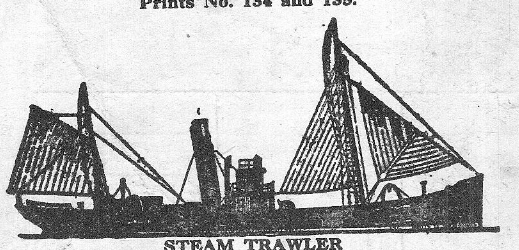

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